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DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

Job Performance Report

Project F-71-R-11

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 5-b. Region 5 Lowland Lakes and Reservoirs Investigations
Job No. 5-c. Region 5 Rivers and Streams Investigations
Job No. 5-d. Region 5 Technical Guidance

by

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JOB PERFORMANCE REPORT

State of: Idaho

Name: REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Project No.: F-71-R-11

Title: Region 5 Lowland Lakes and Reservoirs Investigations

Job No.: 5-b

Period Covered: July 1, 1986 to June 30, 1987

ABSTRACT

Largemouth bass populations were evaluated in Glendale, Lamont, Condie and Windor reservoirs in 1986. Proportional stock density values (PSDs) indicate imbalanced populations in Condie (PSD^{a}O.29) Reservoir. Lamont Reservoir largemouth exhibited the greatest overall growth gains and growth rates and Condie Reservoir bass the least. Growth of bass in southeastern Idaho is comparable to growth of bass in other Idaho waters and those at similiar latitudes.

The percent of Bear Lake cutthroat in the creel at Blackfoot Reservoir increased from 5% in 1984 to 56% in 1986. Approximately 65% of the returns of marked Bear Lake cutthroat from the reservoir are caught the second *year* after planting.

We trapped 806 Bear Lake cutthroat in the Little Blackfoot River weir from May 29 through June 12, 1986. Of this total, 188 were females and 618 were males. We took 190,806 eggs, averaging 1,136 eggs per female.

Three overnight gill net sets at Daniels Reservoir captured 272 Utah suckers and 3 hatchery rainbow. Catch rates at the reservoir in 1986 were better than those during the period 1982 through 1985; however, fishing pressure appeared lower than in previous years.

During a six-week period in January and early February 1986, anglers fished 3, 511 hours at Treasureton Reservoir and harvested 3,596 game fish, of which 99% were hatchery rainbow. During the same period, anglers fished Condie Reservoir an estimated 639 hours and harvested 893 game fish, of which 93% were hatchery rainbow with the remainder being bluegill and largemouth bass. Also during the same period, anglers fished an estimated 669 hours at Weston Reservoir and caught 2,366 game fish, of which 95% were yellow perch and 5% were hatchery rainbow trout.

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OBJECTIVES

1. To monitor the sports fishery and fish growth at Blackfoot Reservoir to evaluate the Bear Lake cutthroat program and egg taking success at the Little Blackfoot River weir.

2. To monitor both the nongame and game fish populations and sport fishing at Daniels Reservoir in May and June to compare with past sizes and numbers of fish caught.

3. To monitor the sport fishery at popular fishing reservoirs in Region 5.

4. To monitor winter angler use and harvest of game fish from three Preston area reservoirs. These include Condie, Treasureton and Weston.

4. To obtain largemouth bass age and growth data to aid in evaluation of specific reservoir regulations and the statewide bass regulation.

RECOMMENDATIONS

1. Continue to morpholine treat and plant Bear Lake cutthroat trout at the mouth of Little Blackfoot River.

2. Mark all Bear Lake cutthroat planted in Blackfoot Reservoir to assess returns to the creel, age at spawning and possible spawning in areas other than the Little Blackfoot River.

3. Continue to trap and take Bear Lake cutthroat eggs from the Little Blackfoot River to establish a viable egg supply for planting in Idaho.

4. Daniels Reservoir should be treated in an attempt to control numbers of suckers. Treatment should occur during low water levels when economically favorable.

5. If during a low water year Daniels Reservoir water is such that treatment is unfeasible, then the introduction of a predatory game fish to control the sucker population and to provide a fishery should be undertaken.

6. Continue the spot creel census checks. This information is used to respond to angler and agency requests about fishing and to evaluate and adjust fish plants.

7. Repeat the ice fishery census in five years to evaluate shifts in angler use and to fine-tune the planting program.

8. Intensify sampling efforts on Glendale Reservoir to obtain age-growth data on the entire bass population.

9. Collect largemouth bass age-growth data on additional Region 5 waters.

10. Obtain estimates of largemouth bass exploitation on a representative number of Region 5 reservoirs through the use of reward tags.

TECHNIQUES

Blackfoot Reservoir

To evaluate returns of Bear Lake cutthroat trout from Blackfoot Reservoir, we clipped adipose fins on 133,424 (46%) of the fish planted in 1983. They averaged 11.70 fish/kg. In 1984, 1985 and 1986, we evaluated the return of these fish by angler checks designed to examine as many fish as possible (Heimer 1985) . We visually determined whether the cutthroat harvested were of the Yellowstone or Bear Lake strain. We continued the plants of Bear Lake cutthroat in Blackfoot Reservoir in 1986, planting 62,090 fingerlings on June 12. They averaged 4.65 fish/kg.

Daniels Reservoir

The peak fishing activity at Daniels Reservoir occurs from the opening day through mid-June. Consequently in past years and again in 1986, we concentrated our efforts to collect as much information as possible during this period of time. Creel data was collected by spot checks before and after anglers had completed fishing. These were normally conducted on weekend days by fishery personnel. Experimental gill nets were set on April 21 at 3:00 p.m. and retrieved on April 22 at 11:00 a.m. Each net was nylon monofilament and 31.8 mm in length. The nets contained five panels of different mesh sizes as follows: 5.08 cm, 3.81 cm, 3.18 cm, 2.54 cm and 1.90 cm.

Creel Census - Reservoirs

We collected creel census information from popular reservoirs in Region 5. Information was obtained during spot checks by virtually everyone in the region. The majority of the checks were made during the early part of the season when the heaviest concentration of fishing pressure occurred. Unless specified otherwise, anglers were checked before they had completed fishing.

Ice Fishing Census - Preston Area Reservoirs

We conducted a structured creel census on Weston, Treasureton and Condie reservoirs during the ice fishing season. Angler counts and interviews were conducted from January 1 to February 11, 1986, on Condie and Treasureton reservoirs. The Weston Reservoir census was discontinued on January 28 because of low angler use.

Two weekend and two weekdays were randomly selected from each interval for count days. Census procedures consisted of 12 angler counts conducted during a 14-day census interval. Three counts, one in the morning, one at

midday and one in the late afternoon, were made on each designated day. Actual count times were selected systematically from three possible time periods to facilitate census work on three different reservoirs.

On all count days, we observed no fishermen on any of the reservoirs during the first half hour after sunrise, or the last half hour before sunset. For this reason, mean hours per fishing day were considered to be from sunrise to sunset, minus one hour. Available fishing hours were determined from Pocatello sunrise-sunset tables.

We interviewed as many anglers as possible to document numbers of fish caught by species, gear type, hours fished and angler residency. Fish lengths and weights were recorded whenever possible. Catch rates for each interval were calculated from interview data and multiplied by estimated effort to yield estimated harvest by species.

Angler counts were used to calculate the mean number of anglers for each day type (weekday or weekend). The mean number of anglers for each day type was then multiplied by the mean number of hours per fishing day as described above to estimate effort by day type.

Largemouth Bass Investigations

We sampled largemouth bass from Condie, Lamont, Glendale and Windor reservoirs. Collection methods included angling, electrofishing and piscicides.

Lengths and weights to the nearest mm and g, respectively, were obtained from all largemouth bass sampled at the reservoirs, except Windor Reservoir where weights were not taken. Scale samples were taken from representative bass at each location.

Condie Reservoir was sampled on August 5 and 6, 1986, using a Coffelt **VVP,** a 2500-watt generator and a mobile positive electrode. Electrofishing was conducted at night with a 5-m river sled modified for electrofishing. In addition, lengths, weights and scales were taken from a sample of the forage base (bluegill) during the electrofishing operation on Condie Reservoir. Bass were also sampled by angling during August.

We collected data on the Glendale Reservoir largemouth bass population during a tournament conducted by the Pocatello Bass Club. All legal and sublegal bass captured during the two-day tournament (August 23 and 24, 1986) were examined.

The largest sample of bass was obtained from Lamont Reservoir on December 2, 1986. On this date, the reservoir was drawn down to 38 acre-feet because of irrigation demand. We applied rotenone to eliminate the Utah chub population and collected data from adult and juvenile bass picked up during this treatment.

Data on largemouth bass was also obtained from fish collected through angling at Windor Reservoir on June 14, 1986.

Population Structure And Dynamics

Scales were pressed and analyzed using a digitizing pad, a Bausch and Lomb projector and the Apple DISBCAL program developed by Frie (1983). A geometric mean functional regression was used to determine back-calculated lengths at age (Ricker 1973).

Length and age composition, average annual growth increments, instantaneous growth rates and mean length at age were determined for populations in all four reservoirs. Mean fish weight at age and length-weight relationships were determined for all reservoir bass populations, with the exception of Windor Reservoir. Proportional stock densities (PSD) (Anderson 1980) and relative weights (Wr) (Wege and Anderson 1978) were derived for Glendale, Lamont and Condie reservoirs, while relative stock densities (RSD) (Anderson 1980) were calculated for Lamont and Condie reservoirs only. PSD values express the percentage of the stock that is of quality size:

$$PSD(\%) - \frac{\text{number of fish} > \text{quality size}}{\text{number of fish} > \text{stock size}} \times 100$$

Stock and quality sizes for largemouth bass and bluegill were as recommended by Anderson (1980). They were 200 mm and 300 mm, respectively, for bass and 80 mm and 150 mm, respectively, for bluegill. An index of fish condition, relative weight (W_r), was calculated as:

$$Wr - \frac{W}{Ws} \times 100$$

Where:

W - the measured weight of an individual fish, and W_s
- the standard weight.

W_s values are derived using species-specific standard weight equations. The standard weight equation for largemouth bass was developed by Wege and Anderson (1978):

$$lo810Ws - 5.316 + 3.191\ log10L$$

Where:

W_s - the standard weight in grams, and
L - the total fish length in millimeters.

The standard length-weight equation for bluegill, developed by Hillman (Wege and Anderson 1978), is:

$$loS10Ws - 5.374 + 3.316\ log10L$$

Relative stock density (RSD) is the percentage of any defined size group, particularly those considered "preferable" by anglers, in the stock and is **defined** as:

$$RSD_x\ (\%) = \frac{\text{number of fish} > x\ \text{mm}}{\text{number of fish} > \text{stock size}} \times 100$$

Where:

x - the size of preferred fish.

Preferable largemouth bass were considered to be those greater than 406 mm (Grunder **1986).**

RESULTS

Blackfoot Reservoir Sport Fishery

During the period from May 24 to October 24, 1986, we checked 1,080 anglers from **Blackfoot** Reservoir. They fished 4,774 hours and harvested 600 hatchery rainbow, 35 wild rainbow, 30 wild cutthroat and 844 Bear Lake cutthroat for a total of 1,509 trout. They averaged 1.39 trout/angler and .32 trout/hr (Table 1), nearly matching the 1985 rates of 1.41 trout/angler and .31 trout/hr.

Comparisons of catch rates in June and October are shown in Table 2. During these two. months, the greatest number of anglers can be contacted. Therefore, catch rate comparisons during this period would have greater validity because of a larger sample size. In June 1986, anglers averaged .41 trout/hr. This rate was slightly less than the 1985 rate of .46 trout/hr (Fig. 1). October catch rates for the period 1982 to 1986 are similar. In June 1986, 1.80 trout/hr were caught per angler, versus 2.04 in 1985 (Fig. 2). In 1986, the average angler who had completed fishing at Blackfoot Reservoir caught 1.40 trout/hr.

In 1986, 72% of the anglers fishing Blackfoot Reservoir were Idaho residents and 28% were nonresidents. Of nonresidents, 85% were from Utah. Twenty-five percent of resident anglers were from Caribou County, 23% from Bannock County, 6% from Franklin County and 5% from Bingham County. The remaining 41% were residents of other Idaho counties. Boat anglers comprised 87% of the total, while 13% fished from the bank. Twenty-four percent of the anglers used bait and 76% fished with lures.

Mean length and weight of hatchery rainbow trout during the creel census period were 400 mm and 621 g, respectively (Table 3). This compares to a mean length of 358 mm (Fig. 3) and a mean weight of 484 g (Fig. 4) in 1985. Wild rainbow trout averaged 409 mm in length and 799 g in weight (Table 3). The length and weight variation of hatchery fish appear to be normal and are probably due to the differences in sizes of fish planted in that year.

Table 1. Number of anglers checked, hours fished and catch composition at Blackfoot Reservoir from May 24 to October 24, 1986.

Two-week period starting	No. of anglers checked	No. of hours fished	Catch composition				Total	Trout per angler	Trout per hour
			Hatchery rainbow	Wild rainbow	Wild cutthroat	Bear Lake cutthroat			
May 24	390	1,932	290	5	10	494	799	2.05	.41
June 7	254	936	170	3	10	271	454	1.79	.49
June 21	167	653	62	7	-	72	141	.84	.22
July 5	119	501	23	2	2	4	31	.26	.06
July 19	82	295	24	12	-	-	36	.44	.12
August 2	30	256	5	4	7	-	16	.53	.06
August 16	10	38	9	-	1	-	10	1.00	.26
October 11	28	163	17	2	-	3	22	.79	.13
Totals	1,080	4,774	600	35	30	844	1,509	1.39	.32

Table 2. Anglers checked, hours fished and catch composition at Blackfoot Reservoir for June and October of 1982 to 1986. (All anglers were checked upon completion of fishing.)

Month and Year	Number of anglers checked			Total hours fished	Catch composition						Trout per angler	Trout per hour
	Resident	Nonresident	Both		Wild rainbow	Hatchery rainbow	Wild cutthroat	Hatchery cutthroat	Bear Lake cutthroat	Total		
June 1982	252	19	271	1,341	49	534	117	91	-	791	2.92	.59
June 1983	334	34	368	2,272	7	255	37	89	-	388	1.05	.17
June 1984	504	79	583	2,395	8	110	31	3	38	190	.33	.08
June 1985	666	139	855	3,822	9	729	131	0	874	1,743	-	.46
June 1986	559	213	772	3,412	14	520	20	-	837	1,391	1.80	.41
October 1982	113	35	148	916	29	133	16	11	-	189	1.28	.21
October 1983	198	119	317	2,685	6	404	41	20	-	471	1.49	.18
October 1984	62	25	87	764	-	102	8	-	-	110	1.26	.14
October 1985	39	27	66	206	-	22	-	1	11	34	0.52	.17
October 1986	30	-	30	163	3	17	-	-	3	23	.77	.14

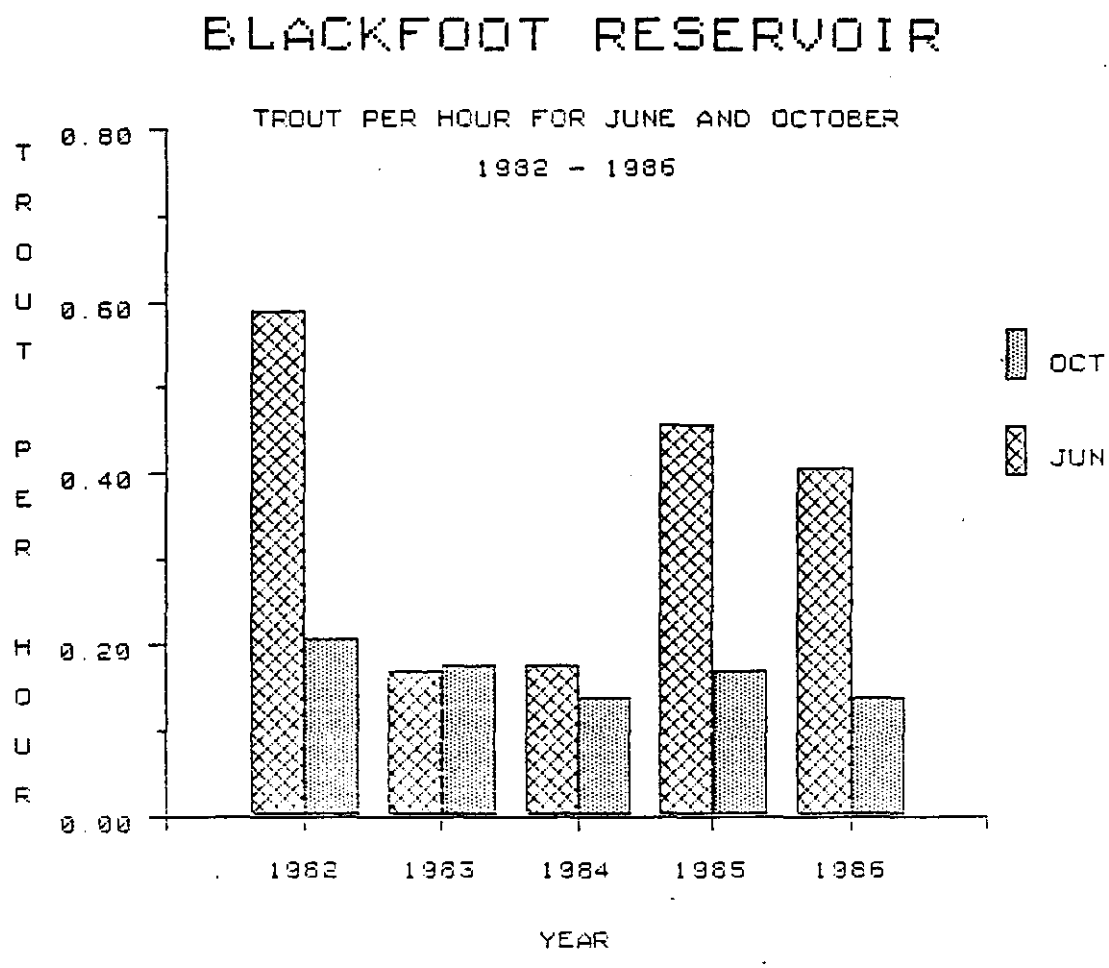

Figure 1. Trout harvested per hour during June and October 1982-1986, from Blackfoot Reservoir.

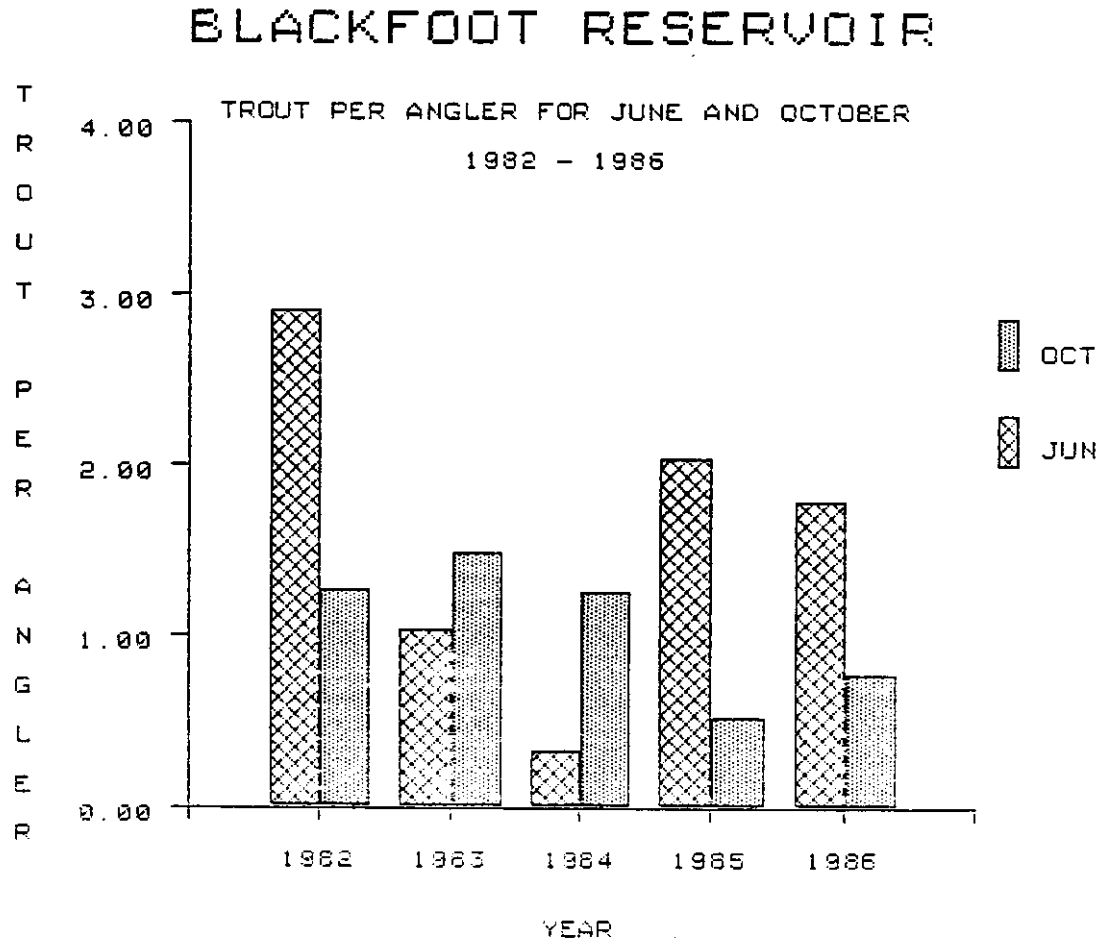

Figure 2. Trout harvested per angler during June and October 1982-1986 from Blackfoot Reservoir.

Table 3. Sizes of rainbow trout caught at Blackfoot Reservoir during the 1986 census period. The number in parenthesis is the sample size.

Two-week period starting	Hatchery rainbow		Wild rainbow	
	Mean total length (mm)	Mean weight (g)	Mean total length (mm)	Mean weight (g)
May 24	386(260)[a]	608(134)	391(2)	550(1)
June 7	404(176)	639(123)	-	-
June 21	390(59)	660(23)	439(4)	885(4)
July 5	558(22)	582(17)	380(3)	750(2)
Means & Totals	400(517)	621(297)	409(9)	799(7)

[a]This includes 183 hatchery rainbow trout with a mean length of 370 mm harvested on June 4 (the boat season opening).

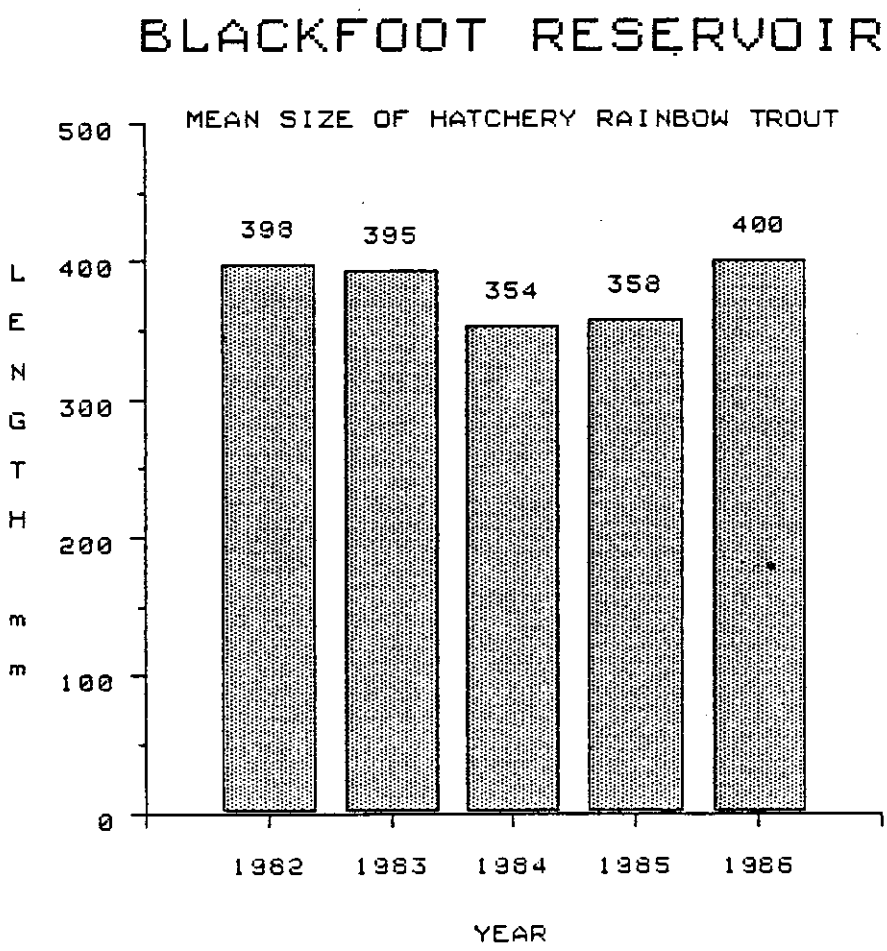

Figure 3. Mean total length of hatchery rainbow trout harvested from Blackfoot Reservoir, 1982 to 1986.

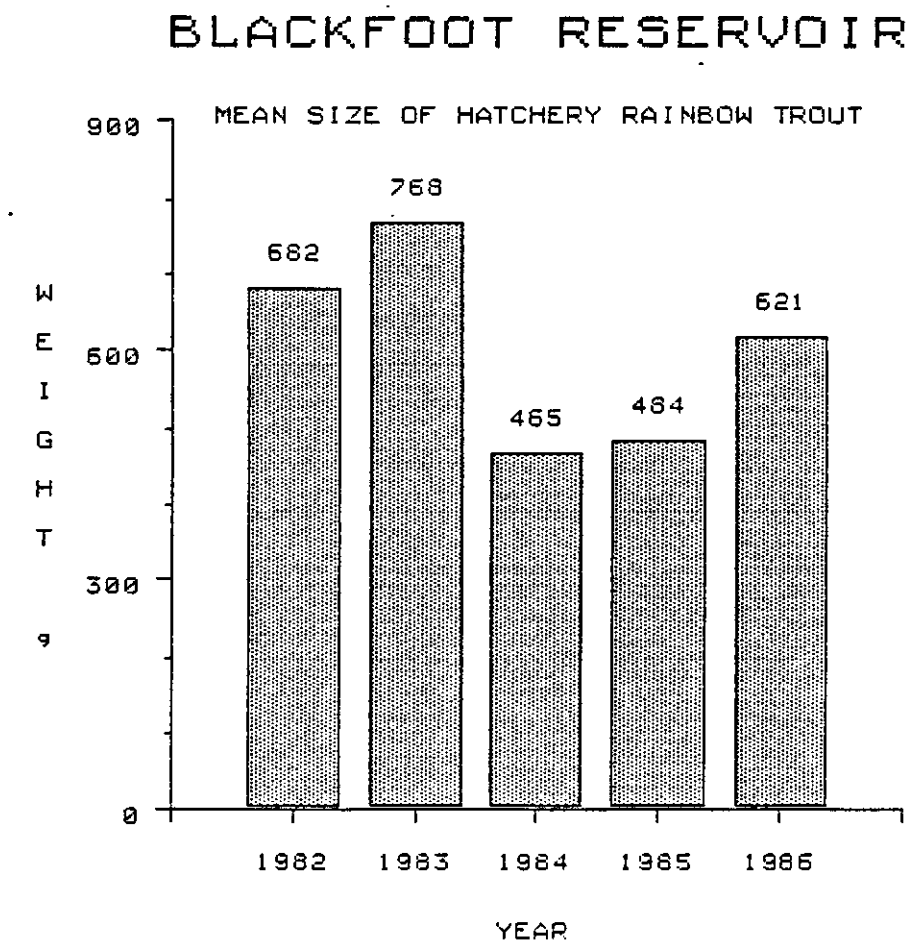

Figure 4. Mean weight of hatchery rainbow trout harvested from Blackfoot Reservoir, 1982 to 1986.

The mean length and weight of wild cutthroat caught in the reservoir in 1986 were 416 mm and 734 g, respectively (Table 4). The mean length of unmarked 1983 planted Bear Lake cutthroat was 407 mm and the mean weight was 645 g. Marked Bear Lake cutthroat planted in 1983 and harvested in 1986 averaged 498 mm in total length and 1,145 g in weight.

During the 1984 creel census, 51 marked Bear Lake cutthroat trout were seen in the creel and 6,920 hours of fishing effort were recorded. During the 1985 creel census, 117 marked fish were seen in the creel and 7,020 hours of effort recorded. In 1986, a total of 11 marked cutthroat were checked and 4,774 hours were censused. This indicates that approximately 60% to 70% of planted Bear Lake cutthroat trout are caught the second year after planting.

Little Blackfoot River Trapping And Egg Taking

A total of 806 Bear Lake cutthroat trout were trapped in the Little Blackfoot River weir from May 29 to June 12, 1986. Of these, 188 were females with a mean length and weight of 428 mm and 756 g, respectively. Six hundred and eighteen males were trapped, averaging 396 mm and 527 g, respectively. The run peaked on June 1, with 110 fish caught in the trap and 50 females spawned. The final egg take was on June 8 when eight females were spawned.

Sixty marked females and nine marked males from the 1983 plant were trapped, comprising 5% of the total. Females averaged 455 mm and 887 g and males 457 mm and 846 g (Table 4a). Overall, trapped Bear Lake cutthroat averaged 402 mm in length and 556 g in weight (Fig. 5). The mean weight of fish captured by anglers was somewhat larger than those caught in the trap (745 g vs. 556 g).

The average water temperature in the river was 16.9 °C, with a maximum of 20 °C and a minimum of 12.5 °C (Table 5).

The total number of eggs collected was 190,806 for an average of 1,316 eggs per female.

Daniels Reservoir

Harvest rates at Daniels Reservoir for May and June 1986, were 1.93 fish/angler and .63 fish/hr (Table 6). These figures are up from the 1985 rates of 1. 62 fish/angler and .49 fish/hr. The average angler fishing Daniels Reservoir caught 1.93 trout per completed trip (309 fish/160 anglers).

The mean total length of hatchery rainbow trout was 285 mm, an increase of 11 mm from 1985 (Fig. 6). Mean weight was 207 g, comparable to a mean of 208 g in 1985 (Fig. 7).

Table 4. Size of cutthroat trout caught at Blackfoot Reservoir during the 1986 census. The number in parenthesis is the sample size.

Two-week period starting	Wild cutthroat		Bear Lake cutthroat (unmarked)		Bear Lake cutthroat (marked)	
	Mean total length (mm)	Mean weight (g)	Mean total length (mm)	Mean weight (g)	Mean total length (mm)	Mean weight (g)
May 24	384(19)	682(14)	400(448)	660(189)	498(2)	1,145(2)
June 7	422(10)	770(4)	411(278)	682(166)	-	-
June 21	-	-	412(72)	682(36)	-	-
July 5	442(2)	750(1)	403(4)	645(393)	498(2)	1,145(2)
Means & Totals	416(31)	734(19)	407(802)	645(393)	498(2)	1,145(2)

[a]This includes 292 unmarked Bear Lake cutthroat trout with a mean total length of 396 mm caught on June 4 (boat season opening) and 105 unmarked Bear Lake cutthroat trout caught on the same date with a mean weight of 658 grams.

Table 4a. Number, mean total length and weight of marked and unmarked Bear Lake cutthroat trapped in Little Blackfoot River weir, May 29 to June 12, 1986.

	Unmarked cutthroat			Ad-clipped cutthroat			Total cutthroat		
	Males	Females	Both	Males	Females	Both	Males	Females	Both
Number Trapped	609	128	727	9	60	69	618	188	806
Mean Total Length (mm)	395	411	397	457	455	455	396	428	402
Mean Weight (g)	522	668	534	846	887	880	527	756	556
Number Spawned	-	89	-	-	56	-	-	145	-
Spawned Mean Total Length (mm)	-	437	-	-	419	-	-	429	-
Spawned Mean Weight (g)	-	774	-	-	736	-	-	759	-

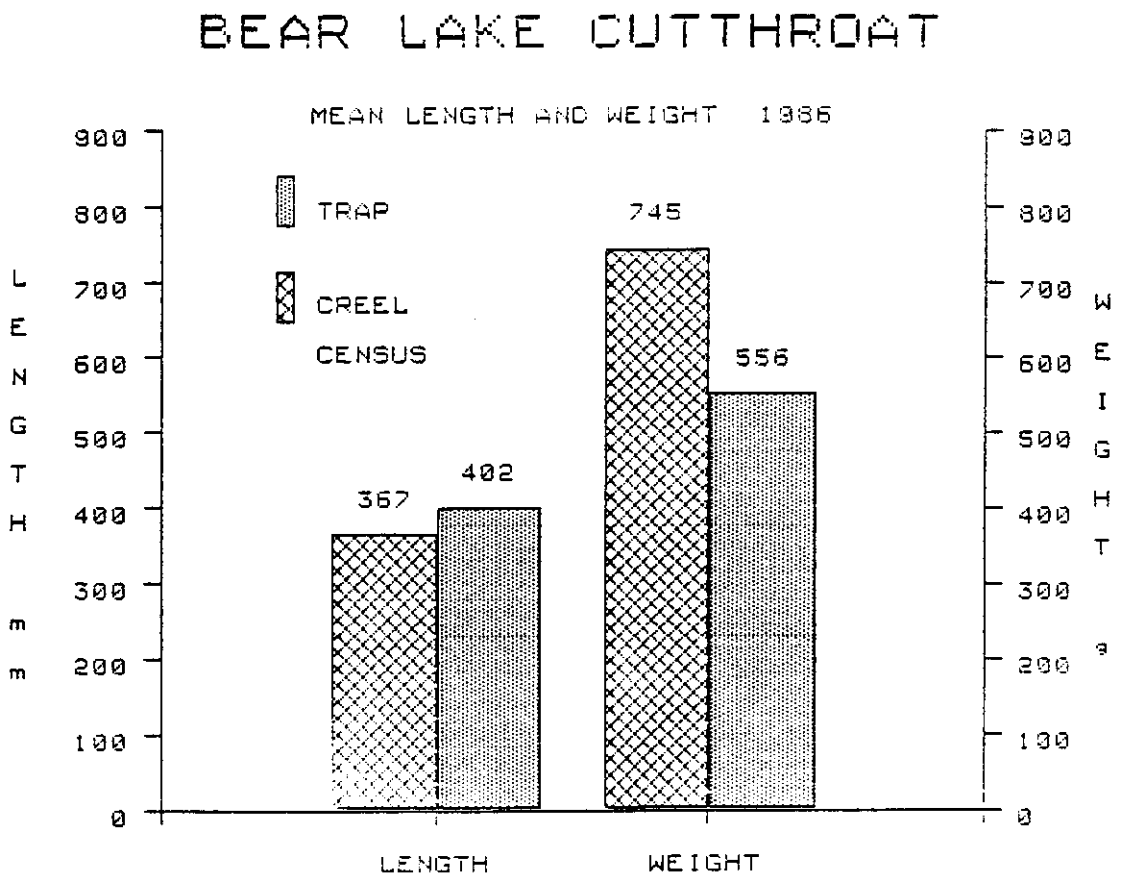

Figure 5. Size of Bear Lake cutthroat caught by anglers and in the trap, Blackfoot Reservoir, 1987.

Table 5. Water temperatures during the trapping project on Little Blackfoot River, 1986.

Date	Temperature °C		
	High	Low	Average
5/31/86	-	14.0	-
6/4/86	20.0	-	-
6/5/86	20.0	15.0	17.5
6/6/86	20.0	14.0	17.0
6/7/86	20.0	13.0	16.5
6/8/86	-	12.5	-
6/14/86	18.0	15.0	16.5
6/21/86	20.0	13.5	16.8
6/22/86	19.7	13.9	16.9

Table 6. Trout harvest rates at Daniels Reservoir on opening weekends of the 1981, 1982 and 1984 fishing seasons and the first two weeks of the fishing seasons in 1983 and **1985.**

Period	Anglers checked			Hours fished	Total harvest			Fish per	
	Resident	Nonresident	Both		Rainbow	Cutthroat	Total	Angler	Hour
May 1981	106	109	215	454	349	15	364	1.69	.80
May 1982	202	96	298	929	283	1	284	.95	.31
May-June 1983	149	141	290	1,009	213	8	221	.76	.22
May 1984	86	107	193	794	129	5	134	.69	.17
May-June 1985	115	82	197	648	319	1	320	1.62	.49
May-June 1986	106	54	160	491	292	17	309	1.93	.63

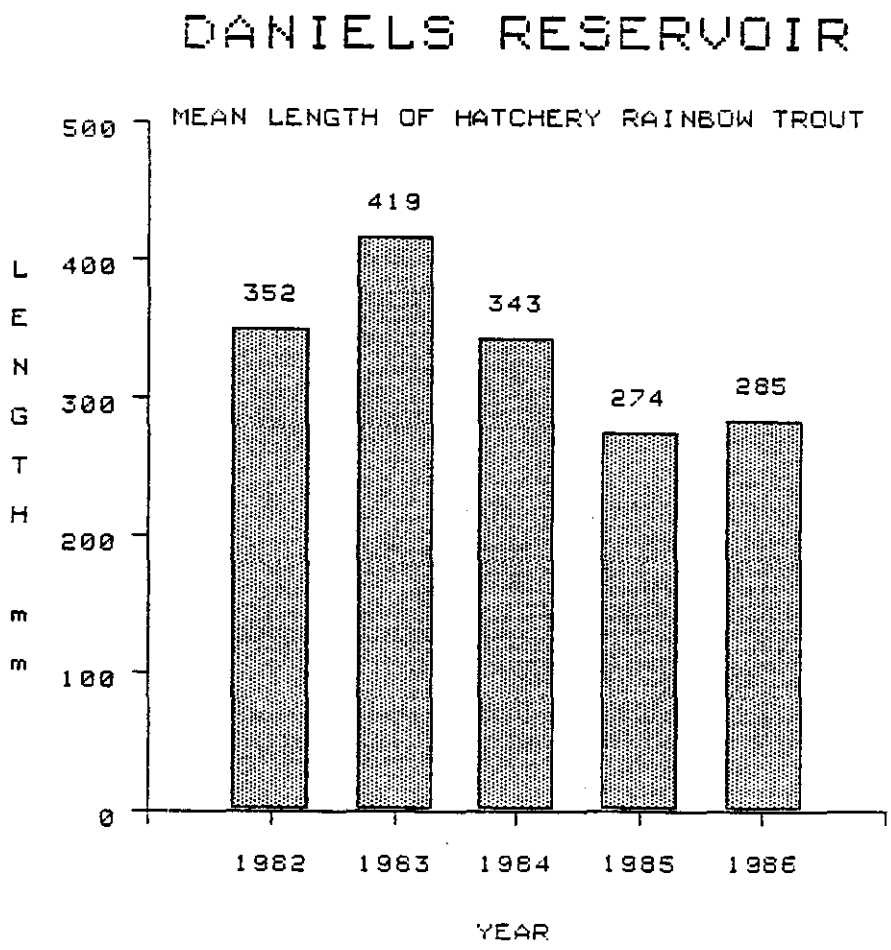

Figure 6. Mean length of hatchery rainbow trout taken by anglers at Daniels Reservoir, 1982-1986.

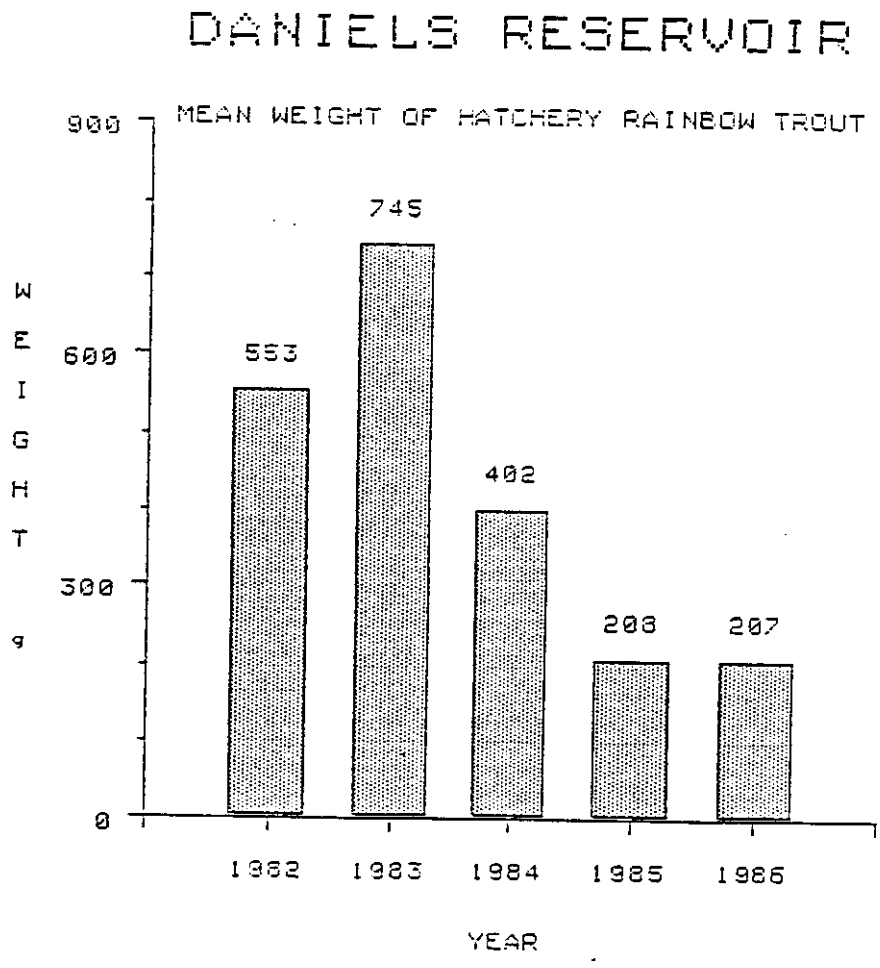

Figure 7. Mean weight of hatchery rainbow trout taken by anglers at Daniels Reservoir, 1982-1986.

The overnight gill net set captured 272 Utah suckers and 3 hatchery rainbow (Table 7). Total length of the suckers was 244 mm and the rainbow 283 mm. Thus, it appears that the sucker numbers have leveled off when compared to the big increase from 1979 to 1984. Although no annual estimates of fishing pressure are available for comparisons, it appears to have dropped off dramatically during this time, probably as a result of the increased numbers of suckers.

Creel Census - Reservoirs

Tabulated results of the spot reservoir creel checks are given in Table 8.

Ice Fishing Census - Preston Area Reservoirs

Treasureton Reservoir

During the six-week census period, anglers fished 3,511 hours and harvested 3,596 game fish. Hatchery rainbow comprised 99% of the catch, while wild cutthroat trout and largemouth bass appeared incidentally (Table 9). The catch rate for the entire census period was 1.01 fish/hr for hatchery rainbow and 1.02 for all other species combined.

Angling pressure on Treasureton Reservoir was over five times greater than that received on either Condie or Weston reservoirs (Table 10). The high angler use on Treasureton may have been the result of repair drawdowns on several nearby reservoirs. Johnson and Foster reservoirs, both popular fisheries, were dewatered during the ice fishing season. Anglers seeking trout probably shifted to Treasureton Reservoir.

Hatchery rainbow caught at Treasureton Reservoir during the census period averaged 285 mm in total length, a figure similar to fish caught at both Condie and Weston reservoirs (Table 11). Hatchery rainbow trout harvested weighed an average of 232 g. Wild cutthroat, although caught rarely, were prized by anglers and averaged 333 mm in length.

We interviewed 265 anglers at Treasureton Reservoir to document residency status. Franklin County fishermen comprised by far the largest component of the fishery (46%) followed by nonresident Utah anglers with 23% (Table 12). Bannock and Caribou County residents followed; both comprised 22% of the fishermen.

Condie Reservoir

During the six-week census period, anglers expended 639 hours and harvested 893 game fish. Hatchery rainbow comprised the bulk of the catch (93%) with largemouth bass being caught incidentally (Table 9). Condie was the only reservoir that supported a bluegill fishery, although harvest catch rates were low (.10 fish/hr). Overall catch rates for Condie Reservoir were 1.4 fish/hr.

Table 7. Number of fish captured in overnight gill nets at Daniels Reservoir, from 1972 to 1986.[a]

Year	Number of net sets	Number of fish captured		
		Rainbow	Cutthroat	Suckers
1972	3	3	42	-
1979	3	41	12	7
1982	2	24	3	71
1984	3	1	2	255
1986	3	3	-	272

[a]During this period, catchable rainbow trout plants have generally varied between 15,000 and 20,000 fish.

Table 8. Anglers interviewed, hours fished, fish harvested and catch rates from reservoirs in Region 5, **1986.**

Reservoir & month	Number of anglers checked Resident	Nonresident	Both	Hours fished	Fish harvested Rainbow	Cut-throat	Fall chinook	Yellow perch	L-mouth bass	Blue-gill	Total	Fish per Angler	Hr.
American Falls													
January	25	-	25	44	1	-	-	7	-	-	8	.32	.18
March	14	-	14	14	5	1	-	-	-	-	6	.43	.43
May	43	-	43	114	15	-	-	-	-	-	15	.35	.13
June	57	-	57	96	33	-	-	-	-	-	-	.58	.34
July	17	1	18	53	14	1	-	-	-	-	15	.83	.28
TOTAL	156	1	157	321	68	2	-	7	-	-	77	.49	.24
Chesterfield													
February	16	-	16	34	22	-	1	-	-	-	23	1.44	.68
May	66	-	66	247	103	5	2	-	-	-	110	1.67	.45
June	346	22	368	1,619	350	10	53	-	-	-	413	1.12	.26
July	226	19	245	1,049	121	3	11	-	-	-	135	.55	.13
August	223	19	242	1,005	253	7	16	-	-	-	276	1.14	.28
September	42	-	42	172	55	-	3	-	-	-	58	1.38	.34
TOTAL	923	60	983	4,152	915	25	86	-	-	-	1,026	1.04	.25
Condie													
May	9	-	9	10	24	-	-	-	-	1	25	2.78	2.50
June	3	14	17	27	4	-	-	-	-	18	22	1.30	.82
TOTAL	12	14	26	37	28	-	-	-	-	19	47	1.81	1.27
Crowthers													
January	4	3	7	15	11	-	-	17	-	-	28	4.00	1.87
February	3	4	7	17	3	-	-	-	2	-	5	.71	.29
May	12	12	24	80	6	-	-	-	-	-	6	.25	.08
June	3	6	9	12	2	-	-	1	-	-	3	.33	.25
TOTAL	22	25	47	124	22	-	-	18	2	19	42	.89	.34
Daniels													
May	87	45	132	413	255	19	-	-	-	-	274	2.08	.66
June	4	7	11	33	13	-	-	-	-	-	13	1.18	.39
TOTAL	91	52	143	446	268	19	-	-	-	-	287	2.01	.64

Table 8. Continued.

Reservoir & month	Number of anglers checked Resident	Nonresident	Both	Hours fished	Fish harvested Rainbow	Cut-throat	Fall chinook	Yellow perch	L-mouth bass	Blue-gill	Total	Fish per Angler	Hr.
Deep Creek													
May	13	20	33	110	23	3	-	-	-	-	26	.79	.24
Devils Creek													
May	3	30	33	155	28	-	-	-	-	-	28	.85	.18
Glendale													
May	17	3	20	34	-	-	-	-	-	-	0		
June	4	13	17	6	1	-	-	-	-	-	1	.06	.17
TOTAL	21	16	37	40	1	-	-	-	-	-	1	.03	.03
Highway Pond													
January	12	-	12	17	21	-	-	-	-	-	21	1.75	1.24
March	11	-	11	18	-	-	-	-	-	-	0		
May	51	2	53	107	41	-	-	-	-	-	41	.77	.38
June	17	-	17	n/a	9	-	-	-	-	-	9	.53	n/a
TOTAL	91	2	93	142	71	-	-	-	-	-	71	.82	.44
Johnson													
June	-	6	6	20	5	-	-	-	-	-	5	.83	.25
October	3	3	6	6	-	-	-	-	-	-	0		
TOTAL	3	9	12	26	5	-	-	-	-	-	5	.42	.19
Lamont													
May	2	7	9	31	14	-	-	-	-	-	14	1.56	.45
June	12	14	26	36	-	-	-	-	3	-	3	.12	.10
TOTAL	14	21	35	67	14				3		17	.49	.25
Montpelier													
May	16	-	16	11	1	-	-	-	-	-	1	.06	.09

Table 8. Continued.

Reservoir & month	Numbers of anglers checked Resident	Nonresident	Total	Hours fished	Fish harvested Rainbow	Cut-throat	Fall chinook	Yellow perch	L-mouth bass	Blue-gill	Total	Fish per Angler Hr.	
Pleasantview													
February	**6**	2	8	**40**	**26**	**-**	**-**	**-**	2	-		**28**	**3.50** .70
March	7	7	14	47	10	-	-	-	1	-	11	.79	.23
June	4	2	6	5					10	-	10	1.67	2.00
TOTALS	17	11	28	**93**	**36**	**-**	**-**	**-**	**13**	**-**	**49**	.175	**.53**
Rose Pond													
February	12	-	12	11	7	-	-				7	.58	.64
March	10	-	10	15	-	-	-				0		
April	12	-	12	13	6	-	-				6	**.50**	**.46**
May	31	-	31	67	12	-	-	1	2		15	.48	.22
June	**48**	**-**	48	**81**	**25**	**-**	**-**				**25**	**.52**	.31
July	**35**	**-**	**35**	**65**	17	-	-	2	3		22	**.63**	.34
August	13		13	13	3			1			4	.31	.31
TOTAL	161	-	161	265	70	-	-	**4**	5		79	.49	**.30**
St. Johns													
May	38	20	58	207	53	-	-				53	.91	.26
June	13	8	21	27	14						14	.67	.52
TOTAL	**51**	**28**	79	234	**67**	**-**	**-**				**67**	**.85**	**.29**
Springfield													
January	214	-	214	227	**636**	**-**	**-**					**636**	2.97 **2.80**
February	**88**	**-**	88	**04**	**163**	**-**	**-**				**163**	1.85	1.73
March	71	1	72	99	59	-	-				59	.82	.60
April	25	-	25	37	8	-	-				8	.32	.22
May	92	-	92	50	12	-	-				12	.13	**.24**
June	55	3	58	76	38	-	-		1		39	.67	.51
July	10	-	10	18	2	-	-				2	.20	.11
October	22	3	25	33	12	-	-				12	**.48**	.36
November	4	2	6	9	6						6	1.00	.67
TOTAL	581	9	590	643	936	-	-		1		937	1.59	1.46

Table 8. Continued.

Reservoir & month	Numbers of anglers checked Resident	Nonresident	Total	Hours fished	Fish harvested Rainbow	Cut-throat	Fall chinook	Yellow perch	L-mouth bass	Blue-gill	Total	Fish per Angler	Fish per Hr
Twenty-Four Mile													
May	105	4	109	387	404	-	-	-	-	-	404	3.71	1.04
June	200	2	202	768	317	-	-	-	-	-	317	1.57	.41
July	45	-	45	134	69	-	-	-	-	-	69		
August	51	1	52	318	134	-	-	-	-	-	134	2.58	.42
September	6	-	6	22	7	-	-	-	-	-	7	1.17	.32
October	4	2	6	13	12	-	-	-	-	-	12	2.00	.92
TOTAL	411	9	420	1,293	943	-	-	-	-	-	943	2.25	.73
Twin Lakes													
May	23	7	84	217	40	-	-	751	-	-	791	9.42	3.65
June	28	30	58	68	3	-	-	-	8	77	88	1.52	1.29
TOTAL	51	77	128	222	57	-	-	1	8	78	144	1.13	.65
Weston													
January	77	7	84	217	40	-	-	751	-	-	791	9.42	3.65
February	7	2	9	17	5	-	-	21	2	-	28	3.11	1.65
March	12	5	17	17	5	-	-	40	2	-	47	2.76	2.76
April	39	9	48	119	38	-	-	24	2	-	64	1.33	.54
May	57	6	63	45	15	-	-	82	9	-	106	1.54	2.16
TOTAL	192	29	221	415	103	-	-	918	15	-	1,036	4.69	2.50
Winder													
May	51	22	73	120	13	-	-	20	36	27	96	1.32	.80
Wiregrass													
May	73	-	73	296	91	-	-	-	-	-	91	1.25	.31
June	13	1	14	27	20	-	-	-	-	-	20	1.43	.74
TOTAL	86	1	87	324	111	-	-	-	-	-	111	1.28	.34

Table 9. Estimated angler harvest and catch rates by species on Condie, Treasureton and Weston reservoirs, January 1 to February 11, 1986.[a]

	Reservoir					
	Condie		Treasureton		Weston	
Species	Harvest	Catch/hr	Harvest	Catch/hr	Harvest	Catch/hr
HRB	829	1.30	3,542	1.01	122	.18
WCT	0	0	47	.01	0	0
LMB	3	.005	7	.002	0	0
BG	61	.10	0	0	0	0
YP	0	0	0	0	2,244	3.53
Total	893	1.40	3,596	1.02	2,366	3.53

[a] Weston Reservoir data only covers the first two intervals.

Table 10. Estimated angler effort (hours) on three Preston area reservoirs during the 1986 ice fishing census.

Two-week interval starting	Reservoir		
	Treasureton	Condie	Weston
Jan 1	1,679	297	288
Jan 15	1,008	127	381
Jan 29	824	215	-
Total	3,511	639	669

Table 11. Length frequencies of salmonids harvested at Condie, Weston and Treasureton reservoirs from June to February, 1986.

Total length (mm)	Reservoir: Treasureton HRB	Treasureton WCT	Condie HRB	Weston HRB
150	-	-	1	-
160	-	-	-	-
170	-	-	-	-
180	-	-	1	-
190	-	-	-	-
200	-	-	1	-
210	4	-	1	-
220	-	-	1	-
230	4	-	2	1
240	9	-	6	2
250	19	1	6	1
260	16	-	9	5
270	24	-	8	1
280	23	-	10	3
290	26	-	12	2
300	27	-	12	4
310	42	-	-	3
320	34	-	3	2
330	8	1	1	-
340	3	2	2	1
350	-	1	-	2
360	1	1	-	-
370	-	1	-	-
Mean lengths	285 (n=240)	333 (n=6)	270 (n=77)	281 (n=27)

Table 12. Angler residency on three Preston area reservoirs during the 1986 ice fishing season.

County or State	Reservoir					
	Weston		Condie		Treasureton	
	%	No.	%	No.	%	No.
Franklin	29	24	7	4	46	130
Oneida	5	4	5	3	0.5	1
Bannock	49	40	38	21	22	62
Caribou	1	1	25	14	22	8
Bingham	9	7	7	4	0	0
Utah	6	6	18	10	23	63
Nevada	0	0	0	0	0.5	1
Total	100	82	100	56	100.0	265

Hatchery rainbow caught at Condie Reservoir during the census period averaged 270 mm and 266 g. Bluegill caught during the census averaged 183 mm and 120 g (Table 13).

We interviewed 56 anglers to document residency status. Bannock County residents comprised the largest single component of the fishery (38%) followed by Caribou County and Utah anglers with 25% and 18%, respectively. Only 7% of the anglers interviewed were from Franklin County.

Weston. Reservoir

During the six-week census period, anglers expended 669 hours and harvested 2,366 game fish. In contrast with the other two reservoirs, Weston is largely a centrarchid fishery with yellow perch comprising 95% of the catch. Hatchery rainbow trout was the only other species checked during the census period, although largemouth bass are reportedly caught through the ice. The rainbow trout harvest rate (.18 fish/hr) was much lower than rates reported for the other two censused waters. However, overall harvest rates, bolstered by high yellow perch densities, exceeded 3.5 fish/hr. Hatchery rainbow trout and yellow perch caught during the census period averaged 281 mm and 180 mm in total length, respectively.

We interviewed 82 anglers to document residency status. Bannock County fishermen comprised 49% of the anglers followed by Franklin County residents (29%). Utah residents comprised 6% of the anglers on Weston Reservoir.

Largemouth Bass Investigations

Total lengths were obtained from 46 largemouth bass collected during a tournament at Glendale Reservoir during 1986. Fish lengths in the sample ranged from 92 mm to 365 mm, with a major mode in the distribution at 320 mm (Fig. 8). Eighty-nine percent (n=41) of fish in the sample were over 300 mm and 96% (n-44) were longer than 200 mm. The high PSD value of 93% (Table 14) is indicative of the length makeup of the sample. Because no fish were >406 mm, an $_{RSD406}$ value could not be calculated.

A total of 333 fish were sampled during the chemical treatment of Lamont Reservoir. Lengths were obtained from all fish and ranged from 92 mm to 504 mm. Major modes in the distribution are evident at 130 mm to 140 mm and 250 mm to 260 mm (Fig. 8). The sample had a PSD of 0.12 and an $_{RSD406}$ of 0.04. Six percent (n=21) of the fish in the total sample were greater than or equal to 300 mm and 2% (n-6) were 406 mm or longer.

Lengths from 91 bass were collected via both angling and electrofishing at Condie Reservoir. Fish lengths ranged from 113 mm to 512 mm. Nearly half of the bass sampled ranged in length from 150 mm to 220 mm (Fig. 8). The abundance of smaller fish in the sample is also reflected in the relatively low PSD and $_{RSD406}$ values of 0.29 and 0.06, respectively.

Lengths of Windor Reservoir bass (n-16) ranged from 142 mm to 270 mm. PSD and $_{RSD406}$ values could not be computed for Windor bass due to inadequate sample size.

Table 13. Length frequencies of centrarchids harvested on Condie and Weston reservoirs, January to February, 1986.

Total length (mm)	Reservoirs	
	Condie	Weston
	Bluegill	Yellow perch
120		1
130		1
140	4	10
150	1	6
160	1	9
170		13
180	2	21
190	2	14
200	2	8
210	3	5
220	1	1
230	1	1
Mean	183	180
	(n=16)	(n=90)

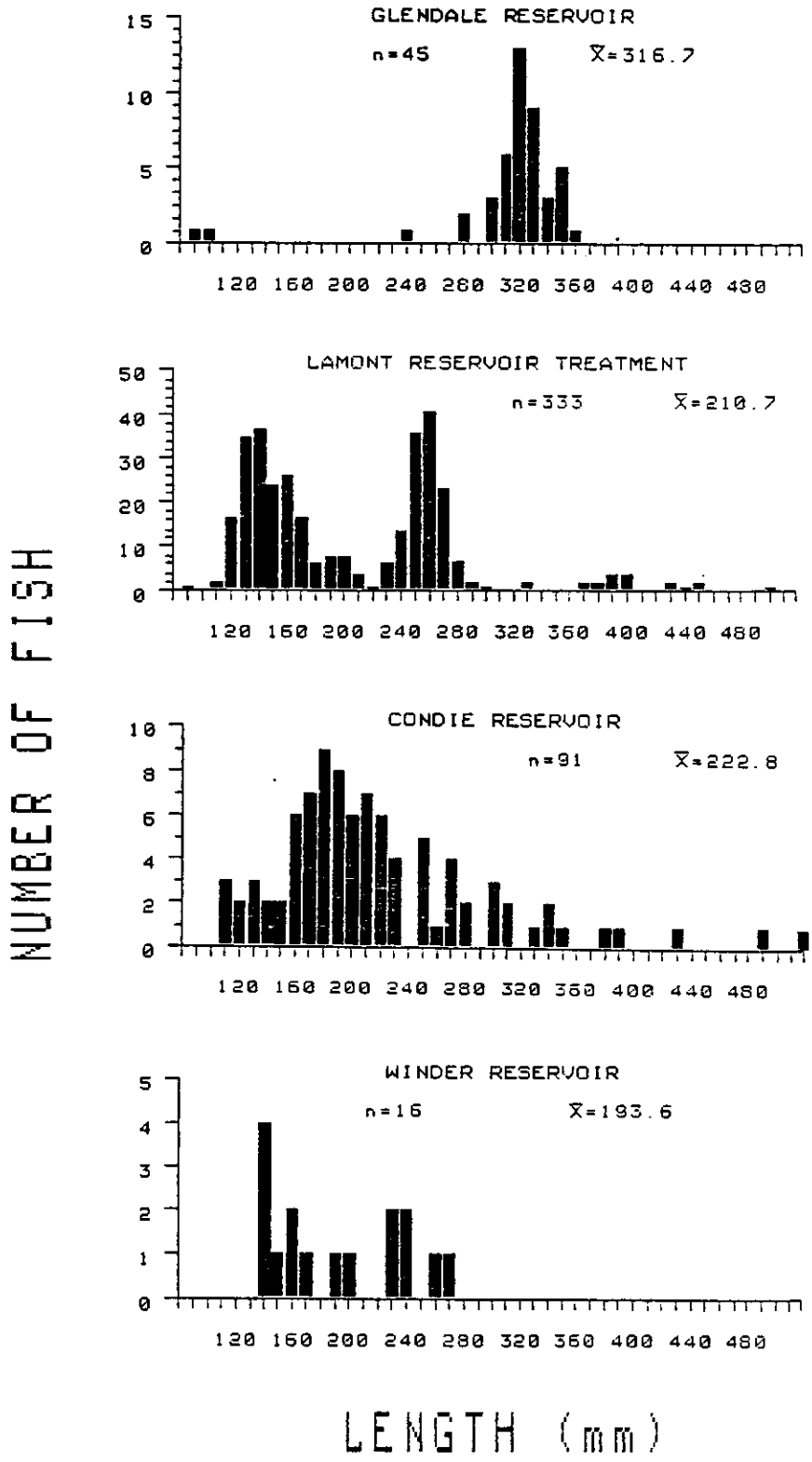

Figure 8. Length frequencies of largemouth bass at four southeastern Idaho reservoirs, 1986.

Table 14. Proportional stock densities (%) and relative stock densities (RSD-406 mm Z) for largemouth bass populations in three southeastern Idaho reservoirs, 1986.

Reservoir	n[a]	PSD value (Z)	RSD value (Z)
Glendale	44	93	No. fish >406 mm
Lamont	162	12	4
Condie	49	29	6

[a]n=number of fish in sample >200 mm (stock size).

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Bluegill sampled from Condie Reservoir ranged from 62 mm to 166 mm (n-72). A mode in the length-frequency distribution is evident at 90 mm (Fig. 9).

Age and Growth

Age composition and back-calculated lengths at age differed for each of the reservoir bass populations (Appendix A). Thirty-five fish were aged from Glendale Reservoir, 77% of which were age 4+ fish. No bass older than 4+ were collected (Table 15). Fish of ages 1+ to 9+ were found in the Lamont Reservoir sample (n-88), with age 1+ fish comprising over one-half of the sample. Ages 2+ and 3+ fish made up the majority (75%) of 91 fish aged from Condie Reservoir and 82% of the 16 from Windor Reservoir.

Growth expressed as length and weight varied considerably between reservoirs. In general, bass from Lamont Reservoir had the overall greatest rate of growth in length, particularly in the older age classes (Fig. 10 and Appendix B). Calculated mean individual instantaneous growth rates (Table 16) as determined from length-weight relationships (Appendix C) also suggest that Lamont Reservoir had the highest growth rate, particularly in the younger and intermediate age classes. Of the three reservoirs for which growth rates were calculated (Glendale, Lamont and Condie), Condie Reservoir bass had the lowest overall gains in length and the lowest growth rates between successive age classes. Glendale Reservoir fish had the largest estimated mean lengths at age, although no data was collected on bass older than 4+. Instantaneous growth rates of Glendale bass, however, were generally lower than those of Lamont bass.

Condition

Condition of individual fish expressed in terms of relative weight (W_r) varied substantially within age and size classes. Mean W_r values by age class also showed considerable variation (Fig. 11). In Condie and Lamont reservoirs, bass in younger age classes fell below the ideal relative weight of 100% (Wege and Anderson 1978; Anderson and Gutreuter 1983). This most likely was due to the fact that the bass are not yet fully piscivorous. In addition, the mean W_r value calculated for all age classes in Condie Reservoir indicates that Condie bass are well below the ideal standard relative weight value with a Wr of 86% (SD-15.9 and SE-1.91) (Table 17). Glendale Reservoir fish are slightly over and Lamont Reservoir fish are slightly under optimum with Wr estimates 106% (SD=12.5 and SE-1.86) and 96% (SD-14.1 and 5E=1.48), respectively.

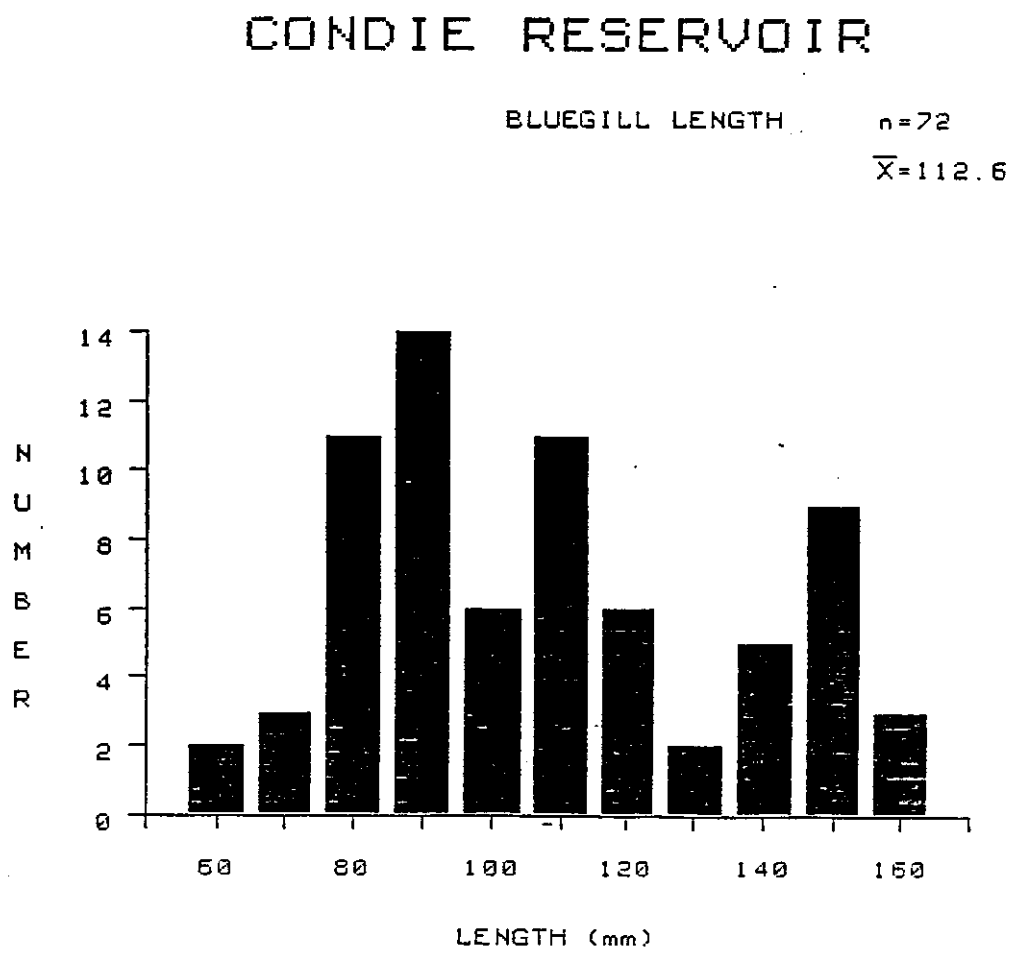

Figure 9. Length frequency of bluegill captured by electrofishing on Condie Reservoir, August 1986.

Table 15. Estimated age composition (numbers) of **largemouth bass samples collected from four southeastern Idaho reservoirs, 1986.**

Reservoir	n	Age 0	1	2	3	4	5	6	7	8	9	10
Glendale	35	--	2	1	5	27	--	--	--	--	--	--
Lamont	88	1	45	20	5	1	12	4	--	--	1	--
Condie	91	--	13	25	43	3	4	--	1	1	--	1
Winder	16	--	--	7	6	3	--	--	--	--	--	--

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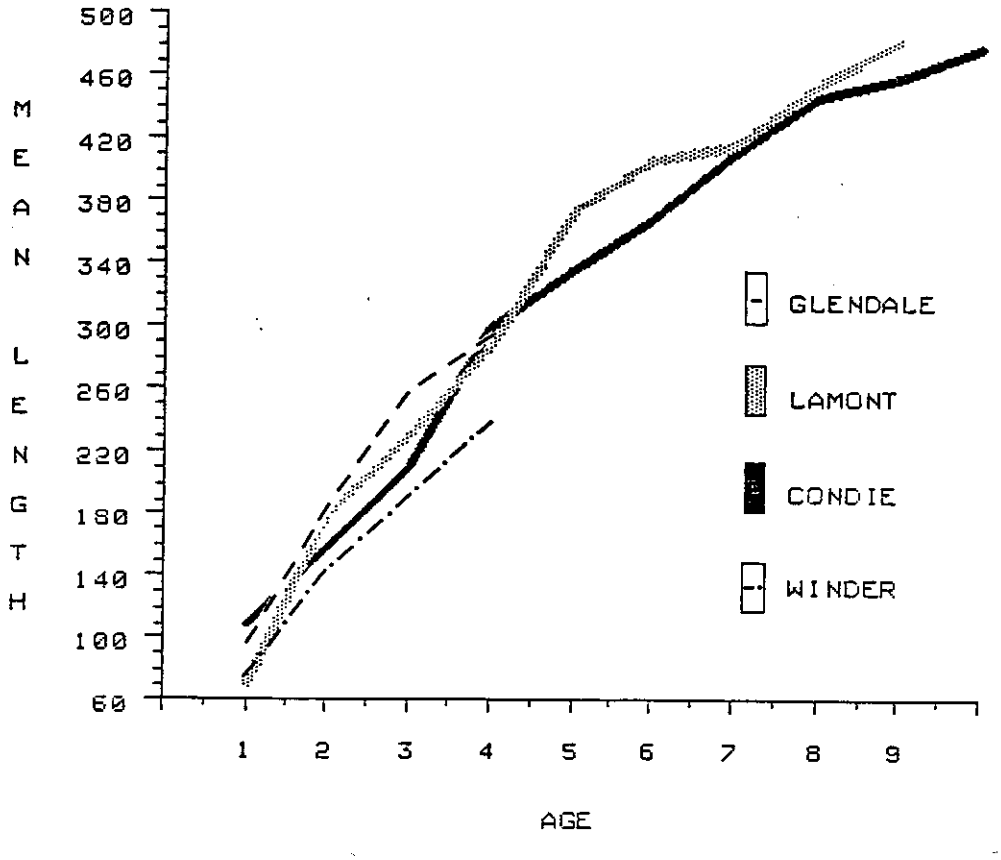

Figure 10. Mean back-calculated length at age for largemouth bass sampled from four southeastern Idaho reservoirs, 1986.

Table 16. Instantaneous growth rates by age interval for largemouth bass populations in three southeastern Idaho reservoirs, 1986.

Glendale Reservoir			Lamont Reservoir[a]		
Age interval	Population growth (G_x)	Mean individual growth (G)	Age interval	Population growth (G_x)	Mean individual growth (G)
1 - 2*	2.65	1.65	1 - 2	3.71	2.93
*2 - 3	0.575	0.856	2 - 3	0.831	0.775
3 - 4	0.169	0.442	3 - 4*	0.668	0.538
			*4 - 5	0.708	0.799
			5 - 6	0.287	0.429
			8 - 9*	--	0.190

Condie Reservoir[b]		
Age interval	Population growth (G_x)	Mean individual growth (G)
1 - 2	1.28	0.884
2 - 3	1.03	0.718
3 - 4	1.32	0.519
4 - 5	0.366	0.339
6 - 7*	--	0.305
7 - 8	0.428	0.010

[a]No age 7 or 8 fish in the sample.
[b]No age 6 or 9 fish in the sample.
*Only 1 fish in age group.
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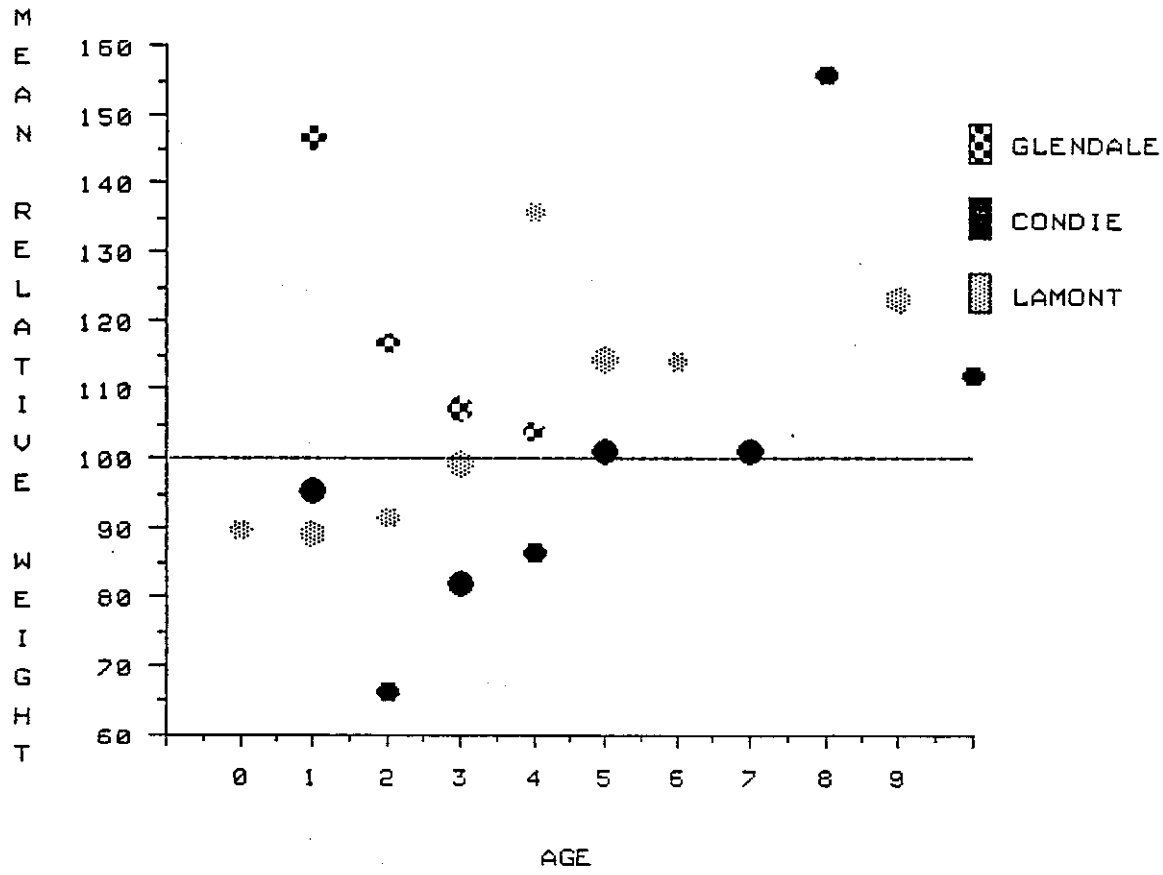

Figure 11. Relative weight (W_r) as a function of mean length at age for largemouth bass from three southeastern Idaho reservoirs, 1986.

Table 17. Estimated mean length at age **(mm) for largemouth bass in various geographic locations.**

Water	Age 1	2	3	4	5	6	7	8	9	10
Glendale	95	180	255	295						
Lamont	69	180	229	285	372	406	414	455	482	
Condie	109	157	210	299	337	368	411	445	459	477
N. Idaho (6 lakes)[a]	68	136	213	279	336	386	405	440	463	484
Hagerman[b]	72	198	296							
ID,UT,MT[c]	72	155	216	229	288	335	372	400		
MI,MN,SD,WI[c]	94	184	255	294	336	364	390	414	443	448

[a] Based on the mean of six lakes in northern Idaho (Reiman 1983).
[b] From Grunder (1986).
[c] From Carlander (1977).

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DISCUSSION

Blackfoot Reservoir

Sport Fishery

Fishing success in Blackfoot Reservoir seems to be closely related to water levels. During the high water years of 1983 and 1984, catch rates in the spring were much less than in the "normal" water years of 1982, 1985 and 1986, probably because many of the fish in the reservoir move over the dam while the water is high.

Although catch rates for trout during June fluctuate widely from year to year, rates during October seem to remain constant. Trout per angler catch rates improved in October following low June rates in 1983 and 1984.

The mean length of hatchery rainbow trout has remained constant from 1982 to 1986. The mean length of hatchery rainbow was greater than that of the Bear Lake cutthroat in 1984 and 1985, but slightly less in 1986 (Fig. 12). The mean weight of the Bear Lake cutthroat caught in 1986 was greater than that of hatchery rainbow (Fig. 13).

Bear Lake cutthroat catch increased from 5% of the fish taken in 1984 to 56% of the fish taken in 1986 (Fig. 14). However, Bear Lake cutthroat plants have decreased since 1984 (Fig. 15), which will probably result in a smaller percent catch in future years.

Little Blackfoot River Trapping and Egg Taking

Females comprised 23.3% of all trapped fish. The low number of marked fish trapped (.05%) suggests either high mortality among four-year-old Bear Lake cutthroat in Blackfoot Reservoir, or late maturing fish. It follows that the fish spawned were mostly three-year-olds. In the Egan Hatchery, some three-year-old Bear Lake cutthroat spawn, but the eggs produced from these fish are poor quality and most do not hatch (R. Jensen, Utah Fish and Game, personal communication).

Daniels Reservoir

Harvest rates for 1986 were better than those during the period 1982 through 1985, even though the number of fish planted in 1986 was 252 less than in 1985. Fishing pressure was lower in 1986 than in previous years and could be a factor in the higher catch rates. The increased numbers of suckers at Daniels Reservoir has resulted in a sharp decline in the number of anglers at Daniels Reservoir. The reservoir was completed in 1968 and throughout the 1970s it was noted for the big trout it produced. Unfortunately, the introduction and establishment of a sucker population appears to have seriously impacted the fishery.

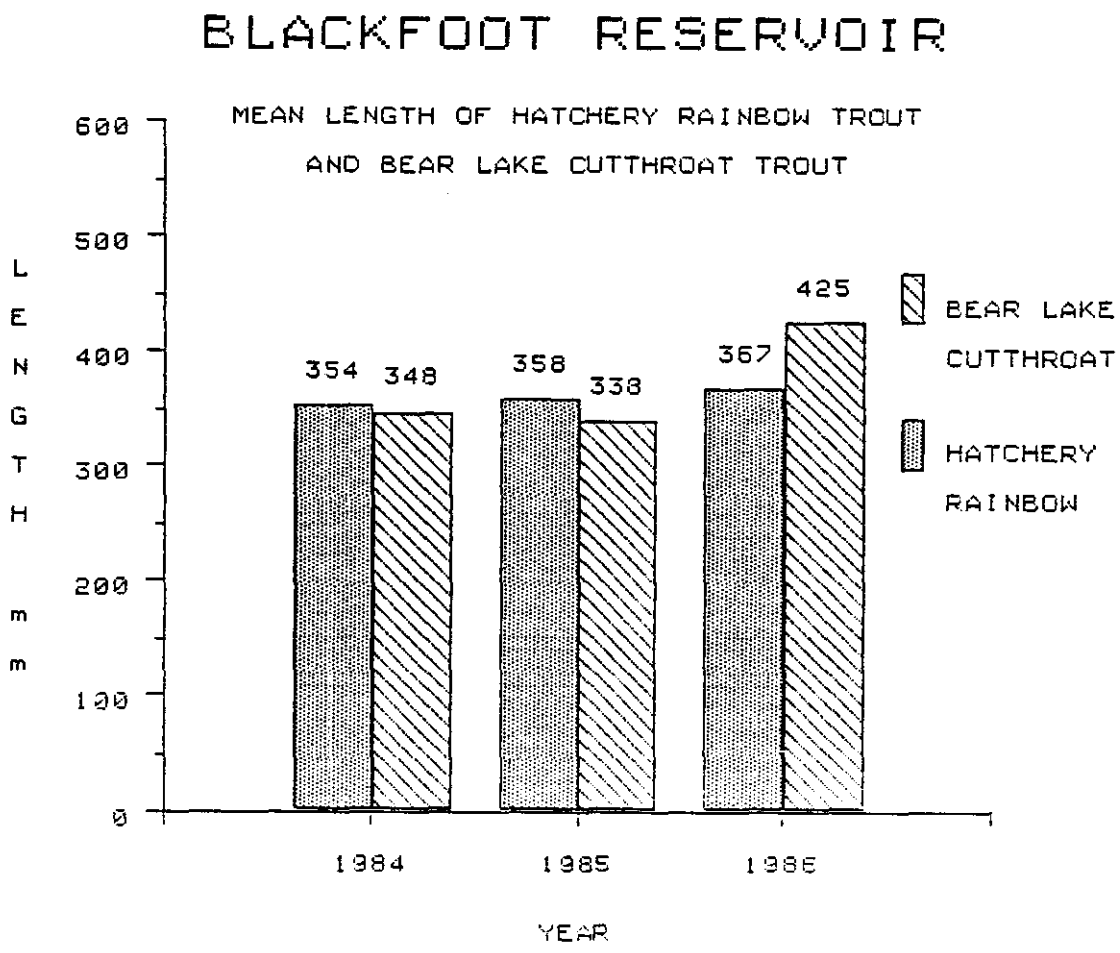

Figure 12. Mean length of hatchery rainbow trout and Bear Lake cutthroat trout in Blackfoot Reservoir$_s$ 1984-1986.

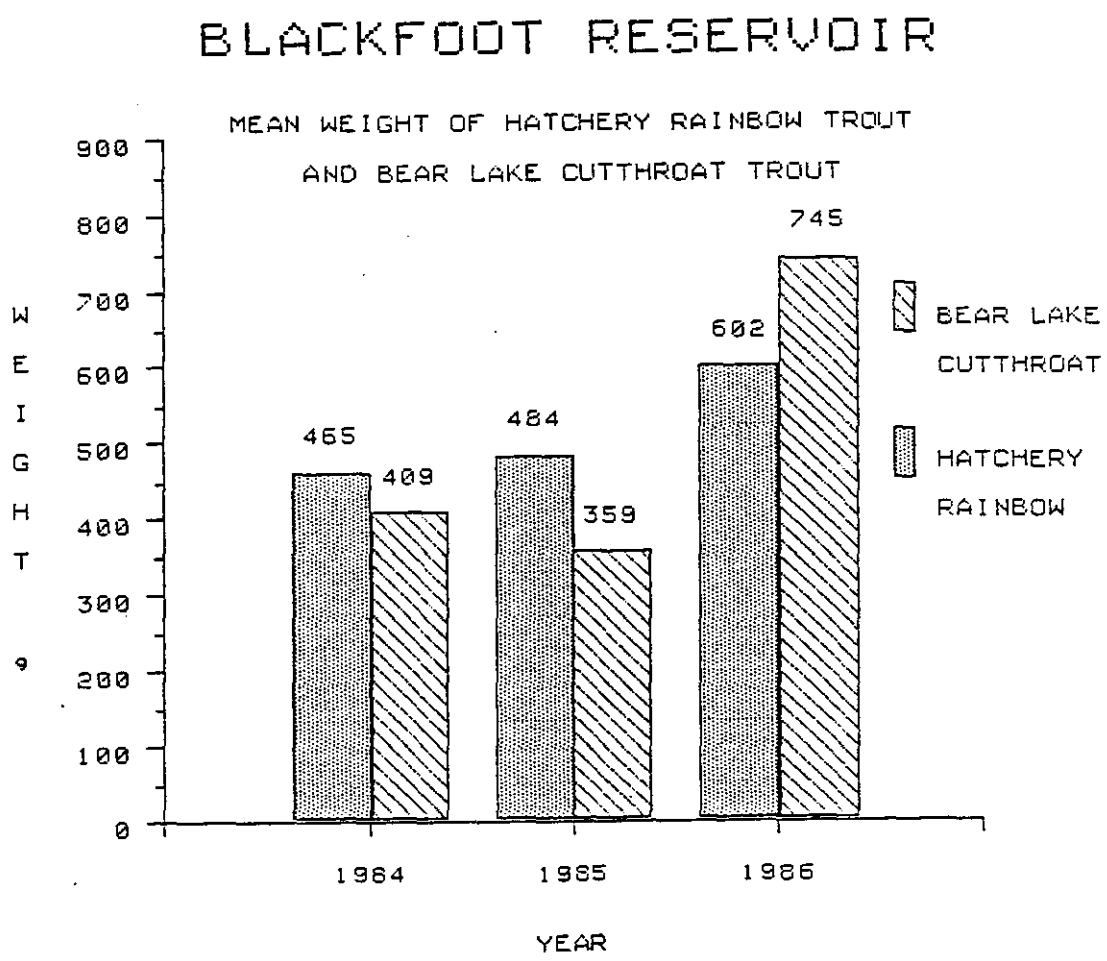

Figure 13. Mean weight of hatchery rainbow trout and Bear Lake cutthroat trout in Blackfoot Reservoir, 1984-1986.

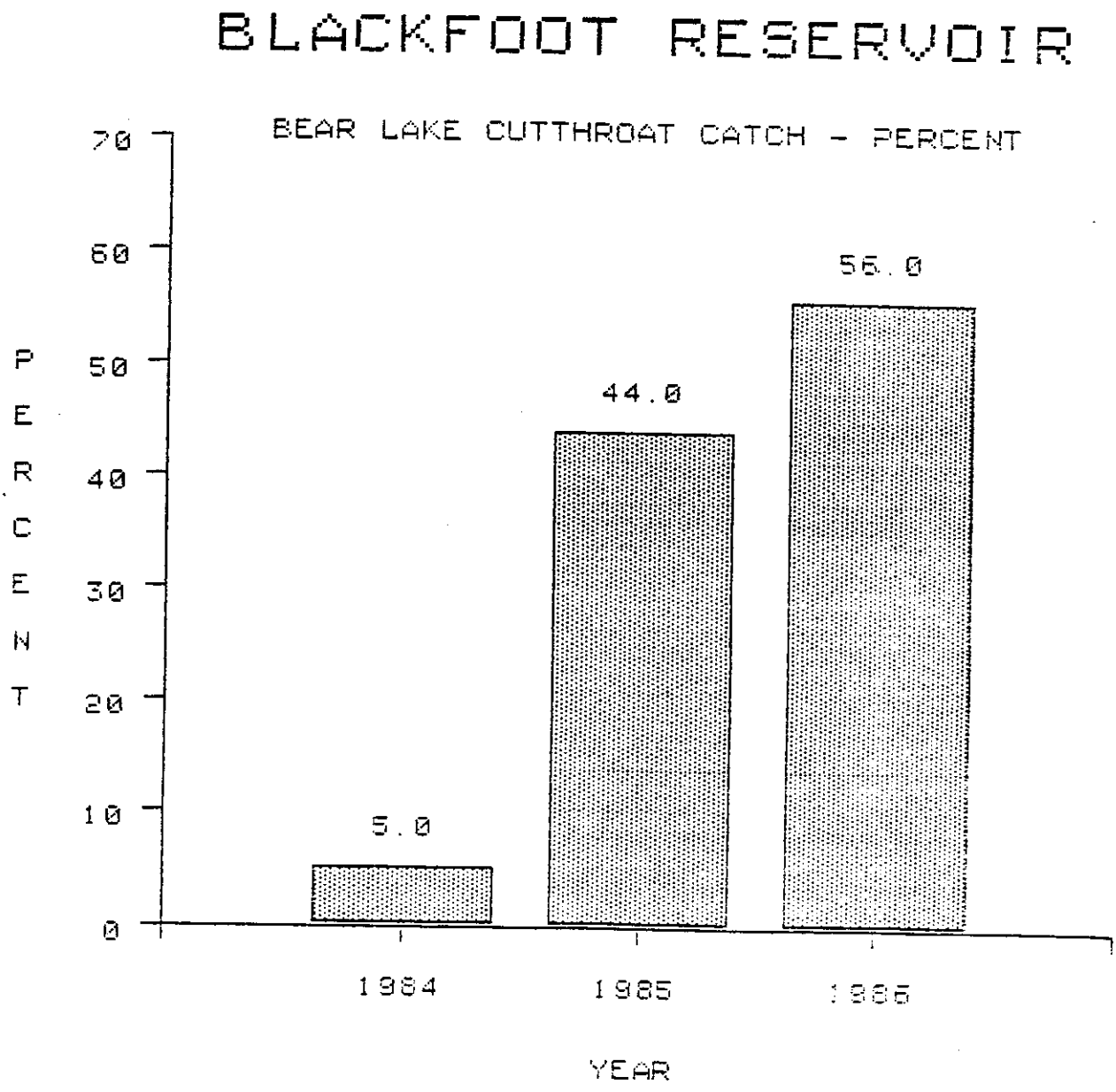

Figure 14. Percent of Bear Lake cutthroat seen in the creel, 1984-1986.

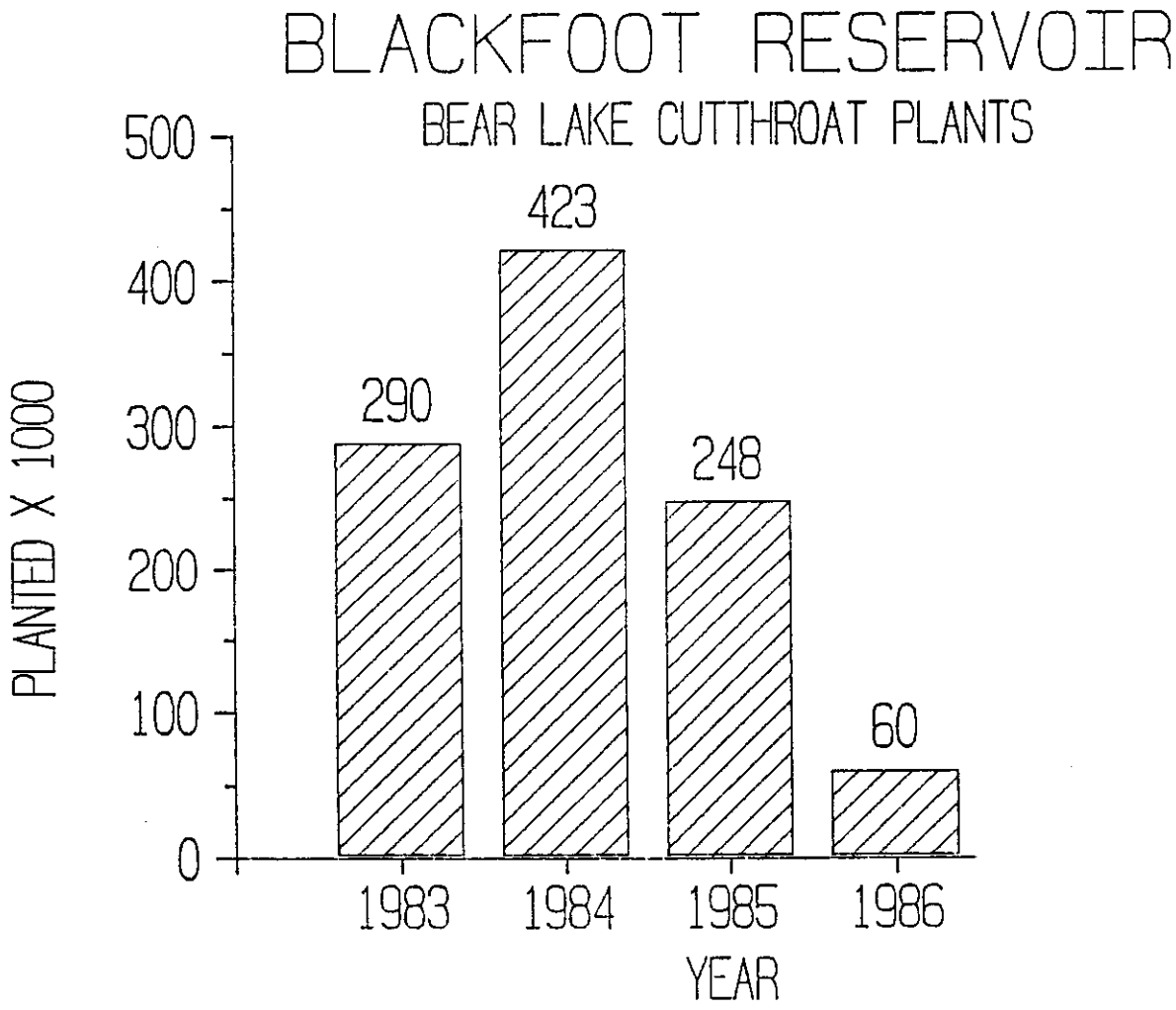

Figure 15. Number of Bear Lake cutthroat planted in Blackfoot Reservoir, 1983-1986.

Largemouth Bass Investigations

Sampling Limitations

Collection techniques at three of the four reservoirs (Glendale, Lamont and Windor) most likely resulted in biased samples. Samples from Glendale and Lamont reservoirs in particular were biased toward larger fish sizes. Sampling of Condie Reservoir was accomplished by electrofishing and collection from angler creels and should be representative.

Population Structure and Growth

The PSD of 0.93 (Table 14) for Glendale Reservoir and the narrow range of lengths found in the sample are artifacts of sampling methodology. Additional data is needed before the status of the Glendale bass population can be determined.

The Condie Reservoir population is comprised of predominately smaller and younger fish (ages 1+ to 3+). Angler use is heavy on Condie, but much of this pressure is directed at hatchery catchables. However, bass harvest may be significant as suggested by low PSD and $_{RSD406}$ values of 0.29 and 0.06, respectively.

The forage base of Condie, which consists primarily of bluegill, may also be affecting the bass population. A PSD of 0.18 calculated for an electrofishing sample (n^e72) of Condie bluegill indicates a stunted forage base. Overpopulation of bluegill when in combination with bass populations often results in increased competition and predation on bass juveniles and poor bass recruitment (Swingle 1950).

Lamont Reservoir had extremely low PSD and $_{RSD406}$ values of 0.12 and 0.04, respectively. Fishing pressure in the past on Lamont was low as a result of the chub problem, and the low fishing pressure may have resulted in stockpiling and stunting the growth of ages 1+ and 2+ bass (Appendix A-2). The slow growth of ages 1 to 3 bass in Lamont Reservoir suggests excess recruitment into these age classes and inadequate recruitment into larger size classes (Carlander 1977).

Competition with fish in the forage base, which consisted of Utah chubs, may also have had adverse effects on the bass population. However, Lamont Reservoir bass had higher instantaneous growth rates than either Glendale or Condie's populations for almost all age intervals. Large increases in weight between ages 0 and 1, and large weight and length increases for age 3 and older fish, account for the higher growth rates. The Utah chub forage base appears to have provided for the population adequately after the bass reached a piscivorous size.

In viewing growth rates for all of the reservoirs (Table 16), the true growth rates (G) are greater than the population growth rates (G_a) in some age intervals, reflecting an apparent selective mortality of larger fish in the affected age classes (Ricker 1971). Other variations between G and G_X are most likely due to inadequate sample sizes for some age classes.

Growth of southeastern Idaho bass populations as determined by estimated mean lengths at age appears similar to that of populations in south central Idaho (Grunder 1986) and northern Idaho (Rieman 1983) (Table 17). First year growth of bass was slightly greater in southeastern Idaho reservoirs than at Hagerman Wildlife Management Area, but second and third year growth was somewhat less. Growth of southeastern Idaho bass in the first, second and third years of life is generally greater than northern Idaho populations, with growth in subsequent years being comparable.

Largemouth bass growth data for the states of Idaho, Montana and Utah compiled by Carlander (1977) also indicates comparable growth for southeastern Idaho bass populations, although length gains for age 4 and older fish appear greater in southeastern Idaho. In comparing growth of bass at similar latitudes, growth of largemouth in southeastern Idaho is also similar to that reported in the states of Michigan, Minnesota, South Dakota and Wisconsin (Carlander 1977).

Condition

Relative weight values (Table 18) may have been affected by a sampling bias toward larger fish in Glendale (sample Wr[a]IO6Z) and Lamont (sample Wr **96%)** reservoirs, although W_r values of the majority of individual fish in both reservoirs fell in the satisfactory range for individuals of 95% to 100% (Wege and Anderson 1978), suggesting fish in good condition.

The majority of Condie fish were below the ideal relative weight values (W_r =86%), indicating problems with condition possibly due to complicative interactions with the forage base. The bluegill population in Condie had a mean Wr value of 86.5 (SD-17.7 and SE-2.1), also indicating stress in the population.

Table 18. Mean and relative (Mr) weights at age for largemouth bass collected from four southeastern Idaho reservoirs in 1986.

Reservoir	Age 0	1	2	3	4	5	6	7	8	9	10
Mean weights											
Glendale		16.5(2)	225.0(1)	480.0(4)	544.2(8)						
Lamont	8.0(1)	48.3(45)	209.1(19)	277.0(5)	995.0(1)	1,268.3(12)	1,506.3(4)			2,500.0(1)	
Condie		31.9(12)	66.3(23)	151.5(2)	187.5(2)	920.0(1)		1,250.0(1)	2,888.0(1)		2,380.0(1)
W_r %											
Glendale		147(2)	117(1)	107.4(4)	103.8(8)						
Lamont	89.7(1)	89.5(45)	91.9(20)	99.5(5)	136.1(1)	114.5(14)	114(4)			123(1)	
Condie		95.4(12)	66.3(23)	82.1(28)	86.5(2)	101(1)		101(1)	156(1)		112(1)

Mean sample W_r (%)	n	W_r	SD	SE
Glendale	45	106	12.5	1.86
Lamont	91	96	14.1	1.48
Condie	69	86	15.9	1.91

FISHTABLE

JOB PERFORMANCE REPORT

State of: Idaho

Project No.: F-71-R-11

Job No.: 5-c

Name: REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Title: Region 5 Rivers and Streams Investigations

Period Covered: July 1, 1986 to June 30, 1987

ABSTRACT

A total of 120 cutthroat spawners (4.5/km) and 218 redds (8.2/km) were observed during counts on upper Blackfoot River tributaries. Redd densities varied substantially on individual tributaries. The 1986 redd count was well below 1978 to 1980 levels, but a statistically significant negative trend was not detected.

Trout densities in a segment of Diamond Creek treated with log-revetment structures were over twice as great as densities observed in a control segment.

On Salt River tributaries, fine-spotted cutthroat comprised the majority of salmonids sampled in five of seven electrofishing stations. Mountain whitefish migrating from the Salt River comprised the majority of the population at the two remaining stations. .Large migratory brown trout utilized the Stump Creek and Crow Creek drainages as spawning streams. Deer and Sage creeks appear to be especially important for brown trout reproduction.

Upper Portneuf River anglers fished an estimated 10,999 hours between May 24 to September 12, 1986. This level of effort was 35% less than reported during a 1979 census. The total catch rate for cutthroat and rainbow trout in 1986 was nearly identical to the 1979 values, but substantial changes in species composition occurred.

The total number of fish present in the Portneuf River immediately below Lava Hot Springs was similar to estimates obtained the past two years. At the Utah Bridge electrofishing station above Lava Hot Springs, trout densities were the highest observed since sampling began in 1979.

Densities of Bonneville cutthroat were similar within and outside cattle exclosures on Preuss and Giraffe creeks. Trespass grazing within the Preuss Creek exclosure appeared to lower trout densities from 1985 levels.

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OBJECTIVES

1. To assess the status of wild cutthroat populations and habitat conditions in the Blackfoot River and tributaries upstream from Blackfoot Reservoir.

2. To estimate angler effort and harvest, monitor long-term population trends and identify existing recruitment sources to Portneuf River and tributaries upstream from Lava Hot Springs.

3. To evaluate the status of both fine-spotted cutthroat and brown trout populations in selected tributaries of the Salt River.

4. To assess the status of Bonneville cutthroat trout populations in Giraffe and Preuss creeks and the effects of cattle exclosures on stream habitat.
5. To assess angler effort and trout catch on streams in Region 5.

RECOMMENDATIONS

1. Standardize spawner survey boundaries on Blackfoot River tributaries and continue to monitor count trends.

2. Intensify electrofishing sampling on the upper Blackfoot River and obtain population estimates on at least 10 stations surveyed during the late 1970s for comparative purposes.

3. Evaluate angler harvest in the upper Blackfoot River to evaluate success of the new 3-fish regulation.
4. Continue monitoring of tree-revetment projects on Diamond Creek.

5. Inventory remaining Salt River tributaries to assess the status of wild fine-spotted cutthroat populations.

6. Survey established redd count areas in Salt River tributaries on a biannual basis to determine trendsin the migrant brown trout population.

7. Evaluate the return to creel of fall spawning, hatchery cutthroat planted in Salt River tributaries.

8. Assess angler harvest of wild fine-spotted cutthroat in Salt River tributaries.

9. Continue long-term population monitoring at two Portneuf River electrofishing stations.

10. Continue to work with other agencies in the development of a detailed sediment abatement program for the upper Portneuf River.

11. Continue monitoring Bonneville cutthroat trout populations in Preuss and Giraffe creeks.

TECHNIQUES

Upper Blackfoot River

Spawning Ground Survey

Between June 11 to 13, 1986, Caribou National Forest (CNF) and Idaho Department of Fish and Game (IDFG) personnel visually assessed spawner use in portions of 11 tributaries of the upper Blackfoot River. The number of spawning-sized fish and visible redds within the stream were counted by walking the stream segment. On Timber, Stewart, Canyon, Browns Canyon, Bacon, Timothy, Sheep, Kendall, Spring and lower Diamond creeks, we surveyed segments similar to those counted between 1978 and 1980 (Thurow 1981). New survey counts were begun on Lanes Creek at the forest boundary and on a small unnamed spring that merges with Diamond Creek about 400 m above the mouth of Yellow Jacket Creek. Results of past surveys were analyzed for trend using linear regression techniques.

Population Sampling

We electrofished two 1,700-m segments of upper Blackfoot River originally identified by Thurow (1981) as sites D and E. Site D encompasses a relatively shallow portion of the river known as the Upper Narrows, while Site E began at the road crossing at the Stocking Ranch and continues downstream to Angus Creek.

To sample river Section D, we towed a canoe upstream and captured fish with a Coffelt 3E variable voltage pulsator and a 2,500-watt portable generator. The canoe served as the negative mobile positive electrode.

In Section E, we drifted downstream in a McKenzie drift boat using the sampling gear described above. To sample this section, we electrofished one-half of the stream during each of the two drifts. During the first drift, we placed captured fish in live boxes along the section to eliminate rehandling of individual fish on the same day.

All fish captured were weighed and measured to the nearest g and mm, respectively. Cutthroat trout greater than 100 mm were marked with an upper caudal punch. In river Section E, we allowed six days for fish to redistribute and returned for a recapture run. No recapture run was attempted on the Upper Narrows transect (D).

Habitat Improvement Evaluation - Diamond Creek

On August 21, 1986, we electrofished two segments of Diamond Creek to evaluate log-revetment structures that CNF personnel had placed in the stream in 1984. Subalpine fir trees, 4 to 5 m in length, had been placed along the streambank to narrow the channel and stabilize cut banks.

We used backpack electrofishing gear to conduct Seber two-pass population estimates on a 78.6-m treated section and a 88.4-m control section located about 2 km downstream. We weighed and measured all fish collected and converted estimates to fish/m^2 and fish biomass/m for comparative purposes.

Creel Census

We operated a check station at the Sucker Trap Access to evaluate fishing success on July 1, 1986, the opening of the Blackfoot River and tributaries upstream from the Highway 34 Bridge.

Salt River Tributaries Inventory

Fine-Spotted Cutthroat And Brown Trout Status

We conducted inventories on Stump and Crow creeks, two major tributaries of the Salt River, to document brown trout spawning and assess the status of fine-spotted cutthroat populations. We selected eight electrofishing stations within these two drainages and completed population estimates at seven (Table 1). Within the Stump Creek drainage, we sampled one station on Stump Creek and one station on Horse Creek. The remaining sampling locations were all within the Crow Creek drainage.

The majority of the stations (six) were sampled using a generator-powered backpack shocker. On five of these stations, we conducted Seber two-pass population estimates using standard techniques (Seber and LeCren 1967). However, on the Middle Fork of Sage Creek, time permitted only one pass and a complete estimate was not attempted.

Peterson mark-recapture' techniques were utilized on Crow CK-1 and Stump CK-1 stations because of their large size. We towed a canoe upstream and captured fish with a Coffelt 3 variable voltage pulsator and a 2,500-watt generator. Recapture runs were made three days apart to allow for redistribution of marked fish. Captured fish were anesthetized and species, total lengths and weights were recorded. Because young-of-the-year trout were not adequately sampled, population estimates were calculated for age 1+ and over.

All electrofishing stations were marked on topographical maps. Corresponding sketches showing major landmarks were drawn and filed in the regional office. At least one boundary of all stations was staked using four-foot conduit, and approximate stake positions have been included on the sketches in order to aid in future station location.

Brown Trout Spawning Evaluation

Between October 20 to 24, 1986, we visually assessed brown trout spawning activity in five portions of Stump and Crow creeks. We counted the numbers of spawning-sized fish and visible redds within each stream segment.

Table 1. October electrofishing stations on Stump and Crow creeks, 1986.

Stream	Station name	Location	Corridor width (m)	Corridor length (m)	Area (m^2)
Stump Creek	STCK-1	Begins at bridge near guard station	7.4	441	3,263
Horse Creek	HCK-1	Begins approx. 40 m above mouth	2.5	86	215
Crow Creek	CRCK-1	Begins approx. 50 m above White Dugway Cr.	6.6	309	2,039
Crow Creek	CRCK-2	Begins at mouth of White Dugway Cr.	2.9	111	322
Deer Creek	DCK-1	Begins approx 50 m above mouth	3.2	157	502
White Dugway Creek	WDCK-1	Begins approx 70 m above mouth	1.8	84	151
N. Fk. Sage Creek	NFK-1	Begins above forest boundary at old weir site	2.6	100	265
M. FK. Sage Creek	MFK-1	Begins 100 m below headwaters	--	--	--

Portneuf River

Angler Effort And Harvest

We operated a check station on the upper Portneuf River at Lava Hot Springs to assess fishing effort and harvest. We began the census on May 25 (the opening of the fishing season) and continued it through September 12. For comparative purposes, the census was operated in a manner identical to that reported by Heimer (1980).

We divided the census into biweekly intervals. During each interval, we contacted virtually all anglers on Saturday, one Sunday and two weekdays. We opened the check station at approximately 0900 hours on sampling days and closed at dusk when safety became a prime consideration. We located the check station approximately 1 km east of Lava Hot Springs at the junction of Portneuf River and Highway 30 roads.

We interviewed all anglers at the check station to document the number of fish caught by species, gear type, hours fished and angler residency. Fish lengths and weights to the nearest mm and g, respectively, were recorded when possible. Catch rates for each interval were calculated from interview data and multiplied by estimated effort to yield estimated harvest by species.

We estimated angler use and catch for three segments of the river, totaling 38.4 km. Section 1 began at the Highway 30 Bridge and extended upstream to the mouth of Pebble Creek, a distance of 17.6 km. Section 2 extended from the mouth of Pebble Creek to a point 100 m above Kelly Bridge (8 km). Section 3 began 100 m above Kelly Bridge and extended to Chesterfield Reservoir, a distance of 12.8 km. All but the lower 150 m of the latter section was channelized in the early 1900s to facilitate water transport to downstream irrigators and reduce flooding.

While conducting angler interviews at the check station, we solicited angler responses to six questions regarding the upper Portneuf River fishery. The questions were as follows:

1. How would you rate the fishing today?
   Good_____ Fair____ Poor_____.

2. How many days do you fish the Portneuf River each year?
   1-7_____ 8-21_____ 22+_____

3. How would you rate the recent trend of fishing on Portneuf River?
   Up_____ Down_____ Same_____ No Opinion_____

4. Which species do you prefer to catch while fishing the river?
   Cutthroat_____ Rainbow_____ No Opinion_____

5. Are you satisfied with the present fishery in terms of: a) size of fish?
   Yes_____ No_____ No Opinion_____

6. If more restrictive regulations benefited the fishery in terms of fish numbers and/or size, would you favor these regulations?
   Yes_____ No_____ No Opinion_____

Population Monitoring

Population estimates were conducted in two sections of Portneuf River using mark and recapture techniques. The lower section was from the Center Street Bridge in Lava Hot Springs downstream to the concrete bridge on Highway 30 at Milepost 369. The upper section was above Lava Hot Springs from the Steel Bridge (Kelly Bridge) downstream to the old Utah Bridge site, a distance of 3 km.

Both sections were electrofished using a McKenzie drift boat, a Coffelt VVP and a mobile positive electrode. We made initial marking runs on the lower segment on July 3 and on the upper one on September 16. Two recapture runs were subsequently made on each section at approximately one-week intervals. We employed the Schnabel multiple census estimator, utilizing the following formula (Ricker 1975):

$$N = \frac{Ct\ Mt}{Rt + 1}$$

Where:

N = population estimate
C_1 = total sample taken on day t
M_t = total number marked prior to day t, and
r_t = total recaptures during experiment to day t.

Confidence limits were obtained by considering R as a Poisson variable.

Recruitment Sources

To identify recruitment sources for the upper Portneuf River fishery, we conducted electrofishing inventories on four major tributaries including Pebble, King, Toponce and Twenty-Four Mile creeks. We selected 11 electrofishing stations in these four streams and conducted Seber two-pass population estimates using backpack electrofishing gear.

We also walked segments of all four streams to locate migration blocks and assess the impacts on upstream fish movement.

Bonneville Cutthroat Trout Assessment

We completed inventories on Preuss Creek and Giraffe Creek to evaluate the status of these Bonneville cutthroat trout populations. Portable backpack electrofishing gear was used to conduct two-pass population estimates (Seber and LeCren 1967). On both streams, we selected two electrofishing stations including a segment within an existing CNF cattle exclosure and one segment immediately adjacent to the exclosure. The exclosure fences on Giraffe and Preuss creeks were constructed in 1979 and 1981, respectively. Mean total lengths and weights to the nearest mm and g were taken from all fish collected.

Creel Census - Streams

Opening day check stations and random contacts were made by conservation officers and fisheries personnel to collect creel census information from popular streams in Region 5.

RESULTS

Upper Blackfoot River

Spawning Ground *Survey*

We surveyed a total of 26.7 km on 11 tributaries between June 11 to 13. A total of 120 cutthroat spawners (4.5/km) and 218 redds (8.2/km) were observed during the counts. As in past years, spawner use on individual survey streams varied widely. Redd abundance (redds/km) varied from 0.6 on Stewart Canyon Creek to 76 on an unnamed Diamond Creek spring (Appendix D).

As can be noted in Appendix D, spawner surveys have been conducted on a number of upper river tributaries since 1978 by both IDFG (1978 to 1980) and CNF personnel (1981 to 1985). However, trend analysis of redd counts on individual streams through time are hindered by the lack of uniform count boundaries in various years. For example, the length of stream surveyed on Timothy Creek has varied from 0.6 km to 7 km, depending on visibility conditions and available manpower.

For this reason, trend analysis was conducted on a broad scale rather than for individual streams. We chose six tributaries that have been surveyed consistently since 1978 and calculated mean number of redds for all six combined (Table 2).

We tested the variables year and mean number of spawners/km for serial correlation using the Durban-Watson statistic. No auto correlation was detected and we subsequently analyzed the data for trend using simple linear regression. The regression analyzed indicates no significant trend exists J F.05, 1,5-0.19), undoubtedly due to outlier values obtained during the 1979 and 1982 surveys (Table 2).

The variables year and mean redds/km were not examined statistically for trend because of the small sample size. However, with the exception of 1982, the number of redds/km observed on the six streams has declined since 1978.

Table 2. Mean numbers of spawners/km and redds/km observed on Spring, Bacon, Sheep, Kendall, Timothy and Browns Canyon creeks, 1978 **to 1986.**

Year	Mean spawners/km	Mean redds/km
1978	18.4	16.6
1979	5.6	-
1980	15.1	-
1981	-	-
1982	39.8	29.0
1983	12.0	13.2
1984	10.5	-
1985	-	-
1986	4.5	6.8

Population Sampling

On August 14, 1986, we completed two sampling runs on the Stocking Ranch electrofishing station (Section E). We captured and marked a total of only 15 cutthroat trout on both runs. Two recapture drifts were completed on August 20 and again we caught only 15 fish, including one recapture. Densities in this segment of the river appeared quite low; therefore, a Schnabel estimate was not attempted.

We electrofished the Narrows Station (D) on August 19, capturing 14 cutthroat. A recapture run scheduled for the following week was canceled after considering the small number of marked fish and poor electrofishing success to date.

The mean total length of cutthroat captured at both stations was 319 mm with a wide range of age classes represented (Fig. 1). However, juvenile fish comprised a smaller segment of the population than in the past. Thurow (1981) reported that over 80% and 35Z of the populations in sections D and E, respectively, were fish <200 mm. Although we obtained no population estimates, total cutthroat trout densities in both stations appeared to be much lower than those reported by Thurow (1981). The number of trout captured on our initial marking runs was 5% and 20% of the mean reported for 1978 to 1980 electrofishing surveys on stations D and E, respectively (Table 3).

We do not believe this wide discrepancy can be attributed solely to differences in electrofishing shocking techniques. The comparatively low number of fish present at both stations during 1986 may be the result of variations in water flows, which in turn influences migration time of the adfluvial populations through stations D and E. Flow records are not available for the Blackfoot River above the reservoir, but August 1986 water flows were low and good habitat was limited.

Habitat Improvement

Diamond Creek. Cutthroat trout comprised the majority of fish sampled from both the treated and control segments of Diamond Creek. We captured 42 trout in the treated section, 38 (90Z) of which were cutthroat. The percentage of cutthroat trout in the control section was nearly identical (91Z). Eastern brook trout comprised the remainder of the fish collected at both sites.

Densities for both eastern brook and cutthroat combined were more than twice as high in the treated segment as in the control area. We estimated the total population present in the treated segment as 47 $\pm$ 8 fish (p=.05), which equates to 0.6 fish/m of stream, or 0.18 fish/m^2. In comparison, the control population of 25 + 5 fish equates to 0.26 fish/m, or 0.06 fish/m^2.

Although trout densities were higher in the treated segment, fish biomass was substantially greater in the control site. Standing crop estimates of the treated and control segments were 0.85 g/m^2 and 1.41 g/m^2, respectively.

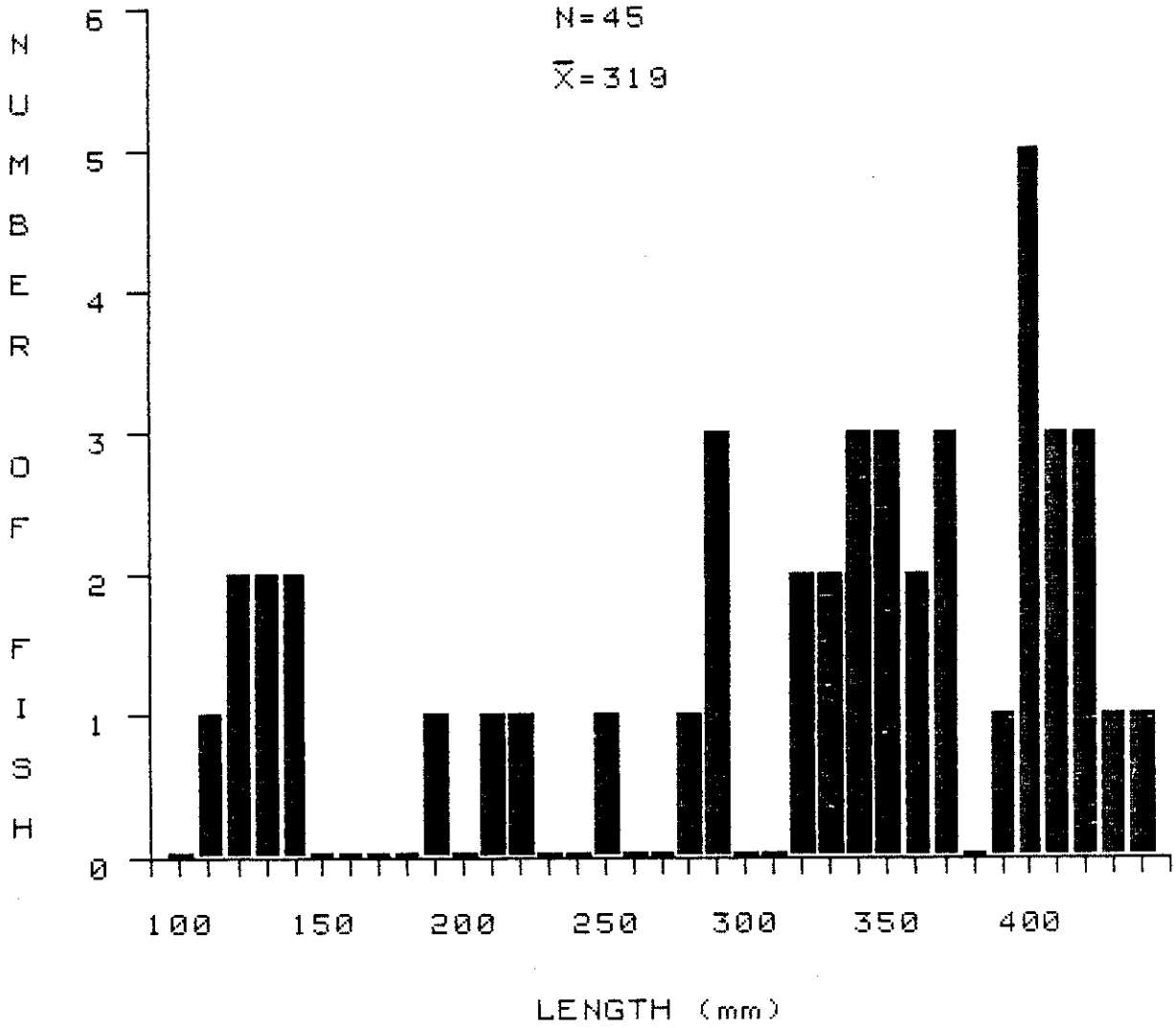

Figure 1. Length distribution of wild cutthroat trout sampled by electrofishing sites D and E, Blackfoot River, August 1986.

Table 3. Number of fish captured during electrofishing runs in sites D and E on Blackfoot River, August 1978 to 1980 and 1986.[a]

Site	Run 1 Date	Run 1 No. of fish	Run 2 Date	Run 2 No. of fish
D	8/18/78	150	8/23	88
	8/14/79	322	8/20	221
	8/17/80	401	8/21	144
	mean=78-80	290	mean=78-80	151
	8/19/86	14	NA	-
E	8/15/78	42	8/21	50
	8/15/79	89	8/21	99
	8/18/80	98	8/22	19
	mean=78-80	76	mean=78-80	56
	8/14/86	15	8/20	15

[a]mean=78-80 data from Thurow (1981).

Trout in the control segment were larger in mean total length and weight for several reasons. The submerged portions of tree-revetments provide ideal habitat for fry and age 1+ fish. As a result, trout <100 mm in length moved into the treated site and comprised a larger percentage of the population than in the control segment (Fig. 2). Other factors that may explain the mean size results are differential angler harvest and/or subtle differences in pool quality between the two sites.

Heimer (1986) estimated that 5.44 trout/m were present in the treated section in October 1985, one year after the structures were in place. The sharp decline in trout numbers to 1986 levels (0.6 fish/m) appears to be related to needle loss on submerged tree branches. In fact, our 1986 treatment estimate (0.6 fish/m) is identical to a 1985 estimate Heimer (1986) reported for an untreated control segment located immediately downstream.

This data suggests that immediate benefits from the revetment structures may be of relatively short duration. However, anticipated long-term benefits, such as bank stabilization, increases in overhanging vegetation, undercut banks, etc. , have not as yet had time to develop.

Creel Census

We checked 224 anglers at the opening day check station on the 1986, after they had completed fishing. They fished 890 hours catching 386 cutthroat (11 of these were identified as the Bear Lake strain), 11 eastern brook and 8 rainbow for a total of 405 trout harvested. Harvest rates were higher than in 1985, increasing from 1.63 to 1.81 fish/angler and from .40 to .46 fish/hr. However, total catch rates (including fish released) decreased from 5.48 to 3.72 fish/angler and from 1.35 to .94 fish/hr (Table 4). The average angler fishing the upper Blackfoot River on July 1, 1986 caught, 1.81 fish/hr (405 fish/224 anglers).

The mean length of harvested cutthroat was 390 mm, the largest since 1982 (Fig. 3). However, the opening day check station was moved downstream from Slug Creek Bridge to the Sucker Trap Access in 1985. Consequently, mean cutthroat lengths before 1985 cannot be directly compared to those after 1985 because fish caught below the Slug Creek Bridge had previously not been included in the sample.

Salt River Tributaries Inventory

Fine-Spotted Cutthroat And Brown Trout Status

Crow Creek. Densities of trout >90 mm in total length in the Crow Creek stations (CRCK-1 and CRCK-2) were 3 and 30 fish/100 m^2, respectively. The density observed in CRCK-2 was nearly twice as great as those observed in any other Salt River station in 1986 (Table 5). The low trout density observed in CRCK-1 appears to be the result of streambank trampling and a lack of riparian cover. This heavily grazed segment of Crow Creek was fenced during September 1986 and in the future, cattle will be excluded completely.

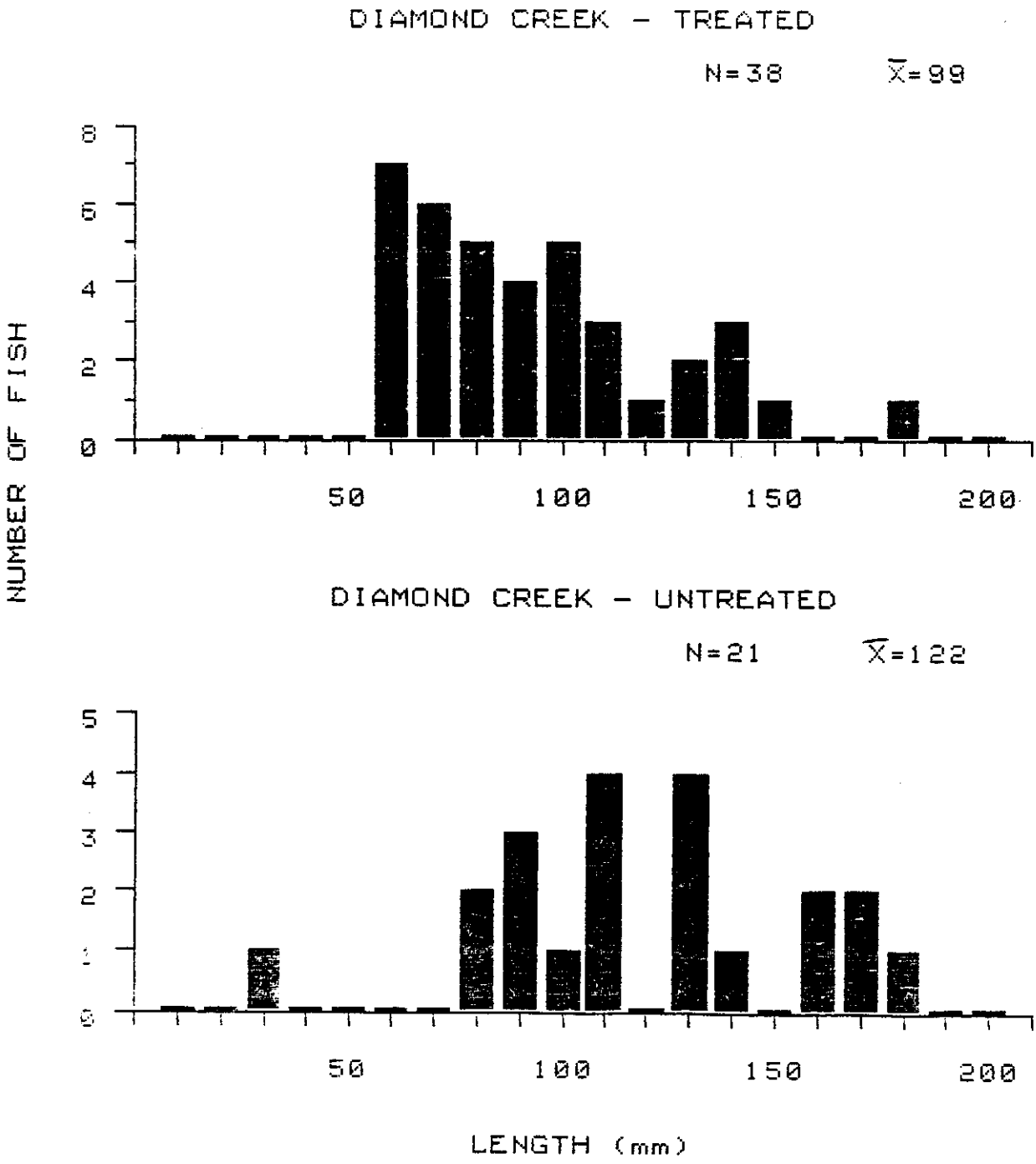

Figure 2. Length distribution of wild cutthroat trout in log-revetment treated and untreated areas of Diamond Creek.

Table 4. Catch rates of anglers fishing the upper Blackfoot River and tributaries on July 1, 1972 to 1986.

Year	Anglers checked	Hours fished	Trout harvested			Total harvest	Fish/ angler	Fish/ hour	No. of trout released	Fish/ angler	Fish/ hour
			Cutthroat	Eastern brook	Rainbow						
1972	415	1,361	1,498	9	-	1,507	3.63	1.11	-	-	-
1973	316	864	885	83	-	968	3.06	1.12	-	-	-
1974	415	1,323	1,064	68	-	1,132	2.73	.86	-	-	-
1975	566	1,777	843	42	-	885	1.56	.50	-	-	-
1976	331	1,345	1,068	41	-	1,109	3.35	.83	-	-	-
1977	232	575	470	43	-	513	2.21	.89	-	-	-
1978	385	1,276	743	40	-	783	2.03	.61	-	-	-
1979	417	1,453	746	153	-	899	2.16	.62	-	-	-
1980	380	1,455	645	87	-	732	1.93	.50	-	-	-
1981	206	791	397	69	-	466	2.26	.59	821	6.25	1.63
1982	172	577	220	26	-	246	1.43	.43	234	2.79	.83
1983	149	542	226	13	-	239	1.60	.44	212	3.02	.83
1984	280	1,180	328	64	-	392	1.40	.33	290	2.44	.58
1985	280	1,134	442	11	2	455	1.63	.40	1,078	5.48	1.35
1986	224	890	386[a]	11	8	405	1.81	.46	428	3.72	.94

[a]Eleven of these fish were classified as Bear Lake cutthroat.

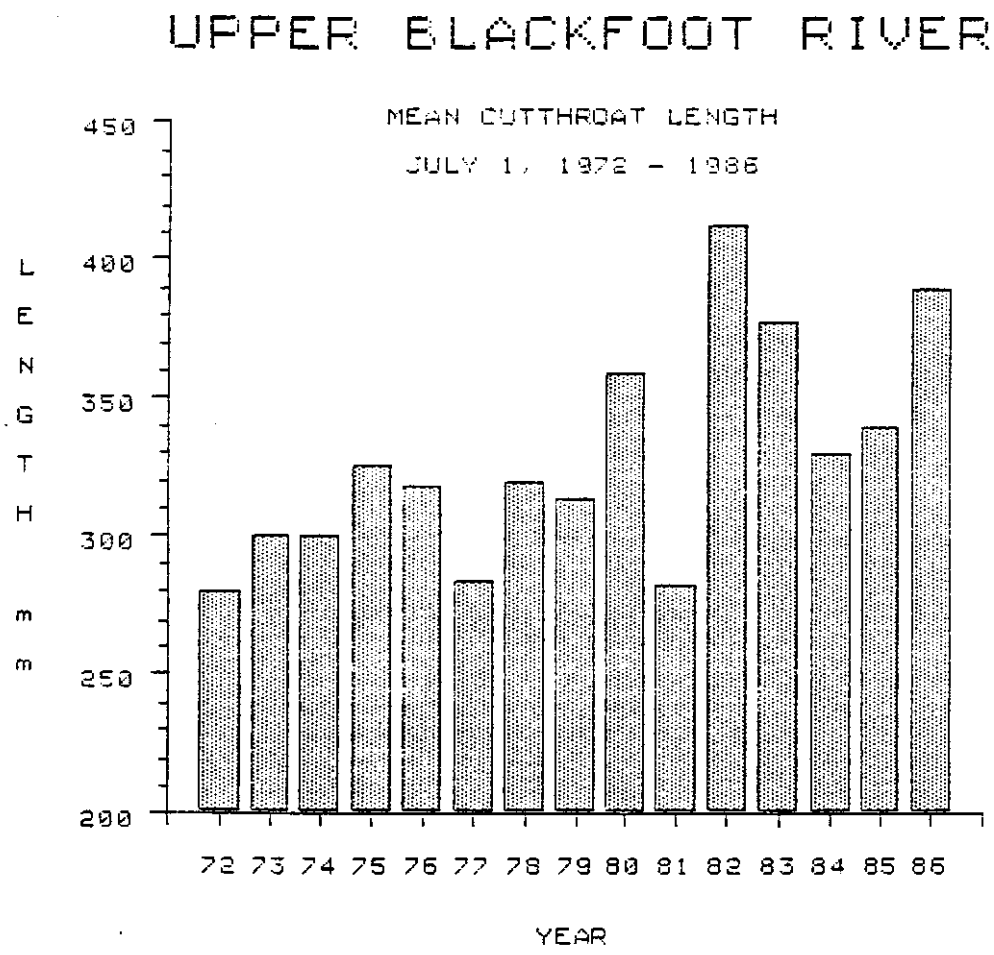

Figure 3. Mean length of cutthroat harvested on opening days on the upper Blackfoot River.

Table S. Population estimates of age 1+ **and older (TL>90 mm) trout for stations on Stump and Crow creeks, October, 1986.**

Stream	Station name	Estimator	Age 1+ & older trout collected			Pop. est.	Conf. limit	Fish/ 100 m	Fish/ 100 m^2	Species[a] comp.(%)
			C_1	C_2	R					
Stump Creek	STCK-1	Peterson	109	84	37	244	(205-301)	55	8	6 BT 26 CT 67 MWF[a] 1 EBT
Horse Creek	HCK-1	Seber	31	5	--	37	(34-40)	43	17	95 CT 5 MWF[a]
Crow Creek	CRCK-1	Peterson	32	26	14	58	(46-76)	19	3	19 BT 12 CT 69 MWF[a]
Crow Creek	CRCK-2	Seber	76	16	--	96	(90-103)	86	30	99 CT 1 BT
Deer Creek	DCK-1	Seber	39	19	--	76	(48-104)	48	15	84 CT 16 BT
White Dugway Creek	WDCK-1	Seber	8	3	--	13	(7-19)	15	9	91 CT 9 BT
N. Fk. Sage Creek	NFK-1	Seber	5	1	--	6	(5-8)	6	2	100 CT
M. FK. Sage Creek	MFK-1	None	6	--	--	--	---	--	--	66% BT 34% CT

[a]WF were not included in population estimates.
Legend: BT = brown trout, CT = cutthroat, WF = whitefish and EBT = Eastern brook trout

Cutthroat trout comprised the majority of salmonids collected in CRCK-2 station **(99%)** (Table 6). Cutthroat ranged in length from 52 mm to 286 mm and averaged 146 mm. Only 18% of the cutthroat sampled exceeded 200 mm (Fig. 4). A single brown trout (166 mm) was the only other salmonid captured in the station.

Mountain whitefish comprised the majority of the salmonids captured in CRCK-1 (68%). Whitefish ranged in length from 110 mm to 434 mm and averaged 278 mm (Fig. 5). Both spent and ripe fish were captured, indicating that spawning was actively occurring. While there was some limited rearing of juvenile whitefish within the station, length frequency analysis indicates that the majority of fish present were migrant spawners, presumably ascending the stream from Salt River.

Cutthroat trout were the next most prevalent salmonid in CRCK-1 (17%) followed by brown trout (16%). Seventy-four percent of the brown trout captured exceeded 200 mm in total length and all fish >250 mm were ripe.

Deer Creek. The density of age 1+ and older trout estimated in Deer Creek was 15 fish/100 m^2. Cutthroat and brown trout comprised 88% and 12% of all salmonids sampled, respectively. Nearly all the cutthroat sampled were juveniles <200 mm in length (Fig. 6). In contrast, 80% of the brown trout sampled exceeded 230 mm in length. The brown trout population seems to he comprised largely of migrant spawners either from Crow Creek or the Salt River.

White Dugway Creek. The station contained low densities of age 1+ and older trout (9/100 m^2). Cutthroat trout comprised 91% of all fish captured, averaging 161 mm in length. The only other fish captured was a juvenile brown trout, 161 mm long. Grazing in the lower portion of this drainage was heavy and riparian habitat was in poor condition.

North Fork Sage Creek. The population density at this station was estimated to be 2 fish/100 m^2, the lowest of all stations sampled (Table 5). Collins and Heimer (1981) reported 4 fish/100 m^2 in this station during September 1981. Cutthroat comprised 100% of the 1986 sample and ranged from 103 mm to 280 mm. The gradient at this section was relatively high and densities are not reflective of the entire stream. Collins and Heimer (1981) reported comparatively high densities of cutthroat in the North Fork immediately below the forest boundary on a single pass estimate.

Stump Creek. The density of age 1+ and older trout in the Stump Creek station was low (8 fish/100 m^2) (Table 5). However, mountain whitefish were extremely abundant, comprising 74% of all salmonids captured. We attempted a Peterson estimate, but sampling below the actual station boundary on the day of the recapture run detected a substantial downstream drift of marked fish. To conduct a whitefish estimate, we extended the lower boundary of the station by 193 m (1,698 m^2) and included this segment in the recapture run. Using methods similar to Gerking (1953) and Moore and Schill (1984), we then calculated a population estimate for the entire segment combined. We estimated that 960 whitefish were present, or 19 fish/100 m^2 (M=220, C-299 and R=68).

Table 6. Salmonids collected by electrofishing Stump and Crow creeks, October 1986.

Stream	Transect	Date	Species	Number of fish	Percent of sample	Length range (mm)	Mean length (mm)[a]	Percent larger than 200 mm
Stump Creek	STCK-1	10/20 and 10/23	BT	41	5	85-635	360	95
			CT	148	20	57-330	150	14
			MWF	559	74	134-388	305(41)	96
			EBK	3	1	160-231	195	33
Horse Creek	HCK-1	10/10	CT	51	96	45-288	119	0
			MWF	2	4	107-129	118 (8)	0
Crow Creek	CRCK-1	10/21 and 10/24	BT	19	16	110-417	267	74
			CT	20	17	60-329	165	40
			MWF	82	68	110-439	278	79
Crow Creek	CRCK-2	10/22	CT	103	99	53-286	146	18
			BT	1	1	-	166	0
Deer Creek	DCK-1	10/21	CT	73	88	44-289	121	11
			BT	10	12	165-394	279	80
White Dugway Creek	WDCK-1	10/22	CT	10	91	105-268	161	10
			BT	1	9	-	161	0
North Fork Sage Creek	NFK-1	10/22	CT	6	100	103-280	171	33

[a]( ) denotes sample size if all fish were not measured.

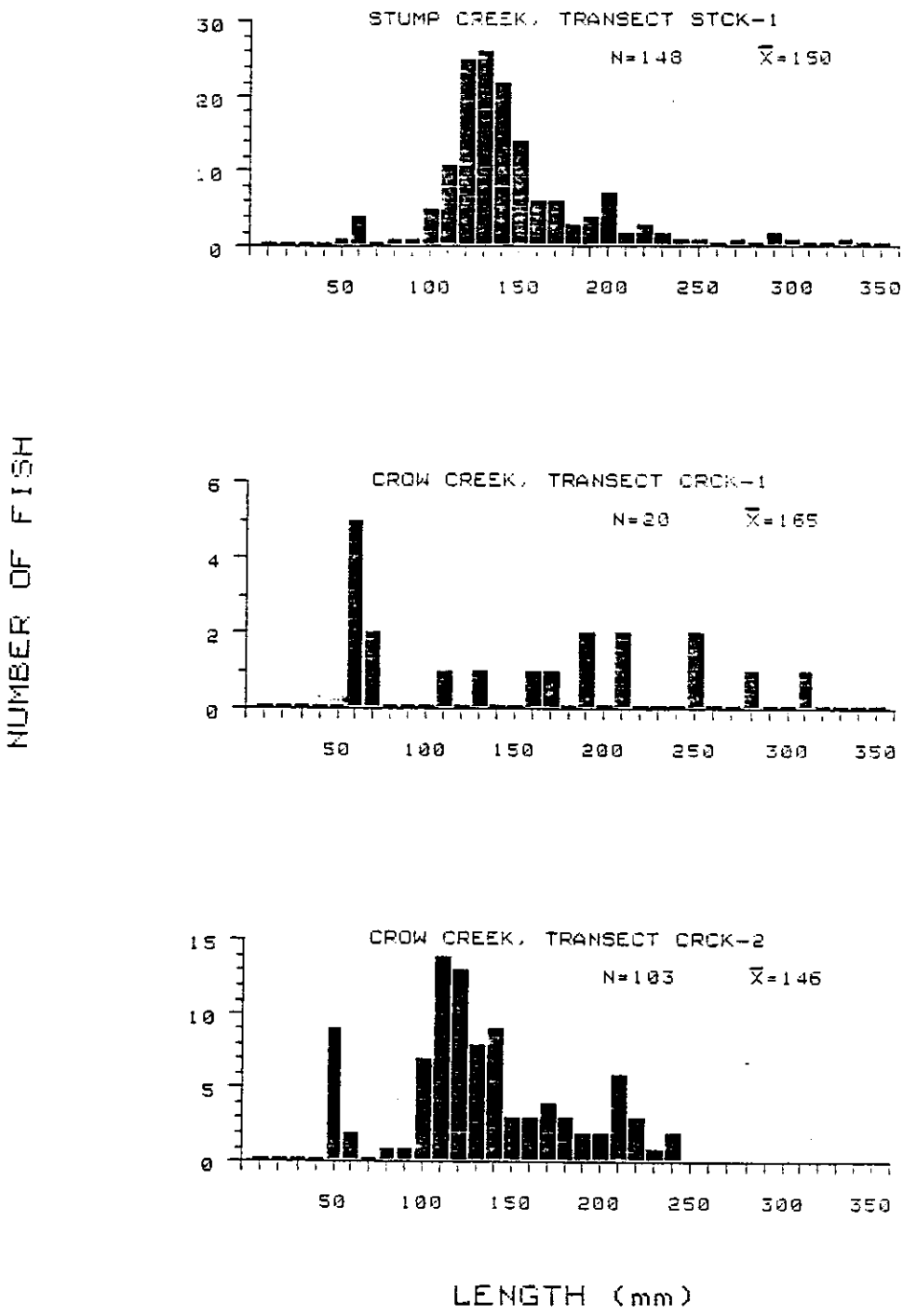

Figure 4. Length distribution of wild cutthroat trout in Stump and Crow creeks, Fall 1986.

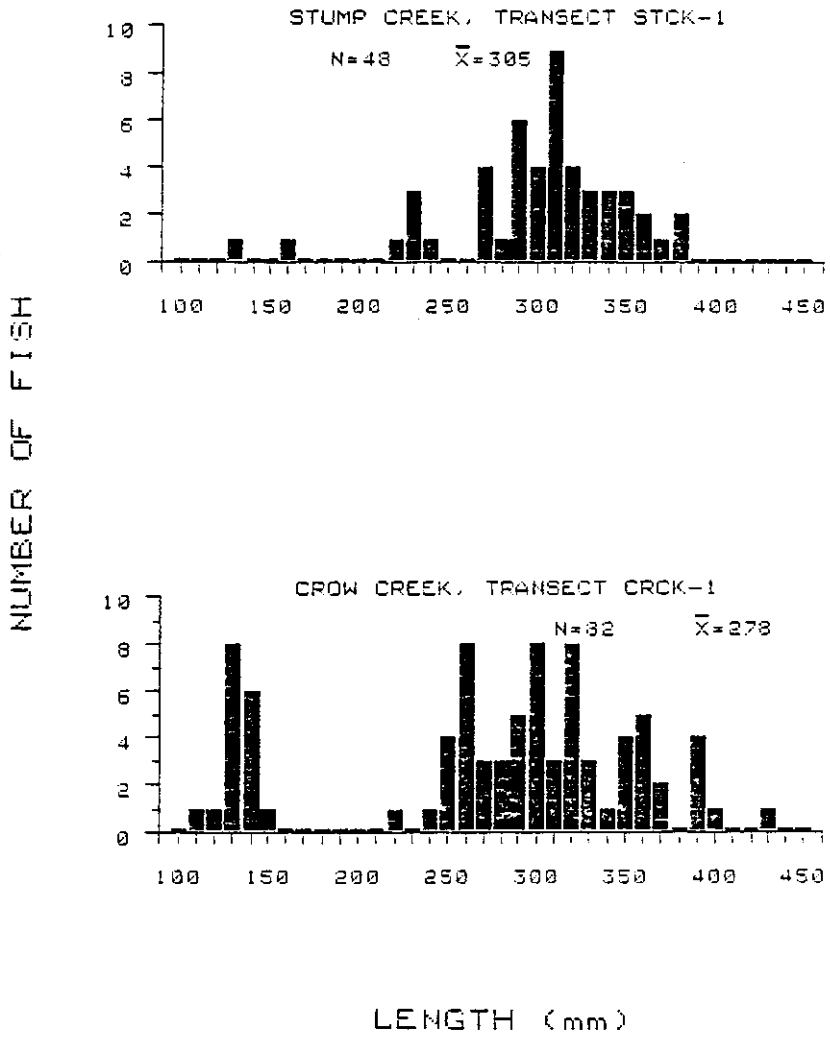

Figure 5. Length distribution of mountain whitefish in Stump and Crow creeks, Fall 1986.

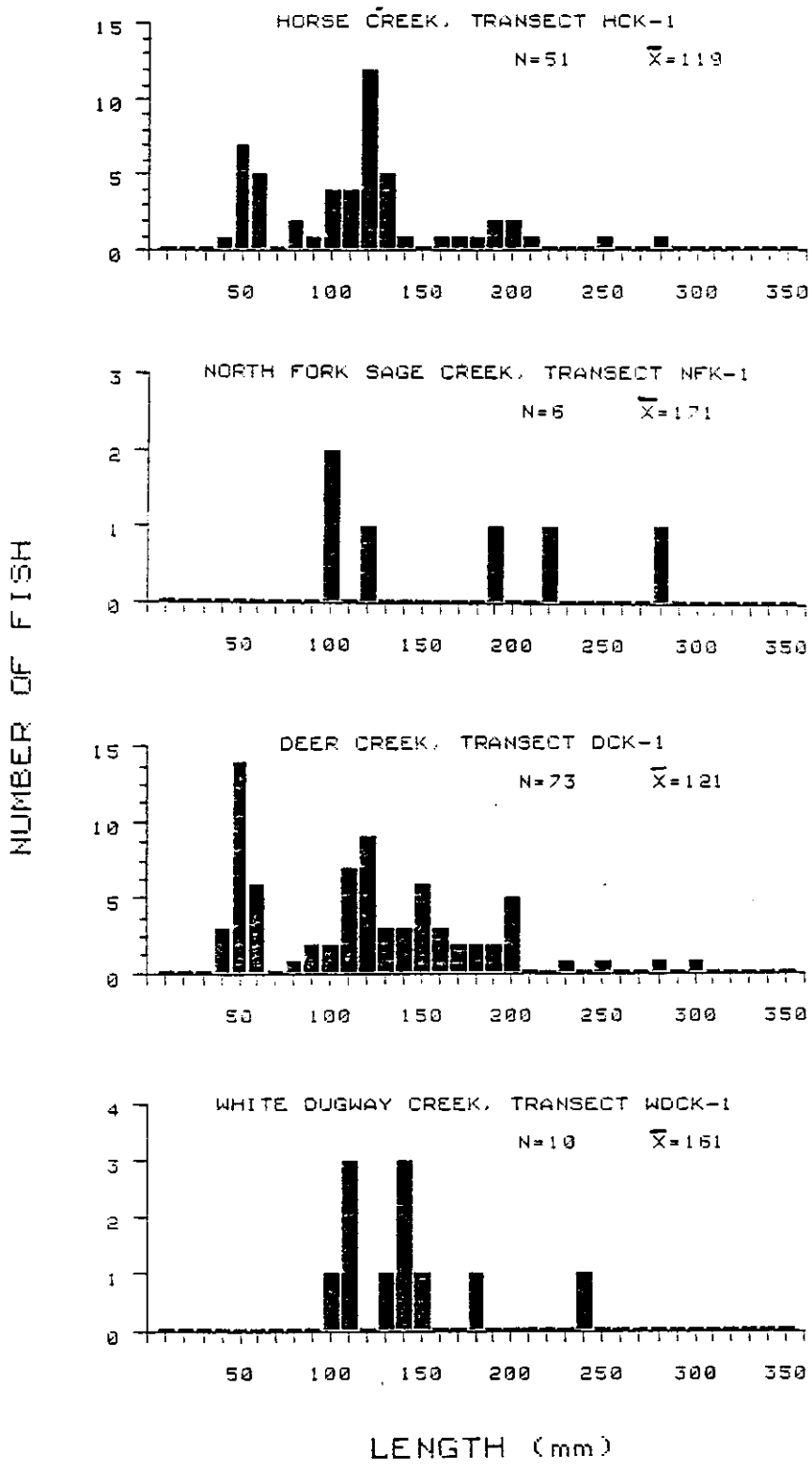

Figure 6. Length distribution of wild cutthroat trout in tributaries of Stump and Crow creeks, Fall 1986.

Whitefish ranged in total length from 134 mm to 388 mm and averaged 305 mm. Very few juveniles were present in the station (Fig. 5) and adults appeared to be spawners from Salt River. Both ripe and spent fish were present and fish were still actively spawning.

This station also contained large brown trout spawners. Of the 41 brown trout collected (mean length-360 mm), 95% exceeded 200 mm (Fig. 7), including one 640 mm fish that weighed 2,910 g. We also collected three eastern brook trout at the station (mean length=195 mm).

Horse Creek. Horse Creek contained moderate densities of ages 1+ and older trout (17/100 m^2). The only trout sampled were cutthroat ranging in length from 45 mm to 288 mm (mean-119 mm). Juvenile whitefish comprised 4% of all salmonids captured, ranging in length from 107 mm to 129 mm. This stream was the only tributary to either Stump or Crow creeks in which we sampled whitefish.

Brown Trout Spawning Evaluation

The number of brown trout redds varied substantially between survey areas, but averaged 10/km on all five stream segments. The counts ranged from 0/km to 26/km on North Fork Sage and Middle Fork Sage creeks, respectively (Table 7). Middle Fork Sage Creek appears to be a critical spawning stream for migratory brown trout in the Salt River drainage. Although no counts were conducted, we also observed numerous redds in Sage Creek between the Crow Creek Road and its confluence with Middle Fork. In Stump Creek, fair densities of redds (13/km) were observed near Horse Creek, but very few fish appeared to be using available gravel above Hyde Creek.

Portneuf River

Angler Effort

Portneuf River anglers fished an estimated 10,999 hours between May 24 and September 12, 1986 (Table 8). Total angler effort on the river peaked during early June and remained nearly the same for the remainder of the month (Fig. 8). Overall, total effort on the river declined by 35% since 1979 when Heimer (1980) estimated angler effort at 16,858 hours. Much of this decline occurred during the first two intervals of the 1986 season when high spring runoff produced marginal fishing conditions. High, turbid water conditions attributable to the complete draining of Chesterfield Reservoir may have contributed to further declines in angler use in August 1986 when compared with 1979 levels.

As in past years, the use of bait proved to be the most popular fishing method on the upper Portneuf River. Bait fishermen comprised 77% of all anglers contacted in all study sections during 1986. Lure fishing was next in popularity (12%) followed by fly fishing at 9% (Table 9). Heimer reported similar angler results in 1979 when bait, lure and fly fishermen comprised 74%, 132 and 13%, respectively. However, Chi-square analysis indicates that a significant change in angler gear type occurred between 1979 and 1986 ($x^2.05.2=19.20$). A decline in anglers using flies was responsible for the change.

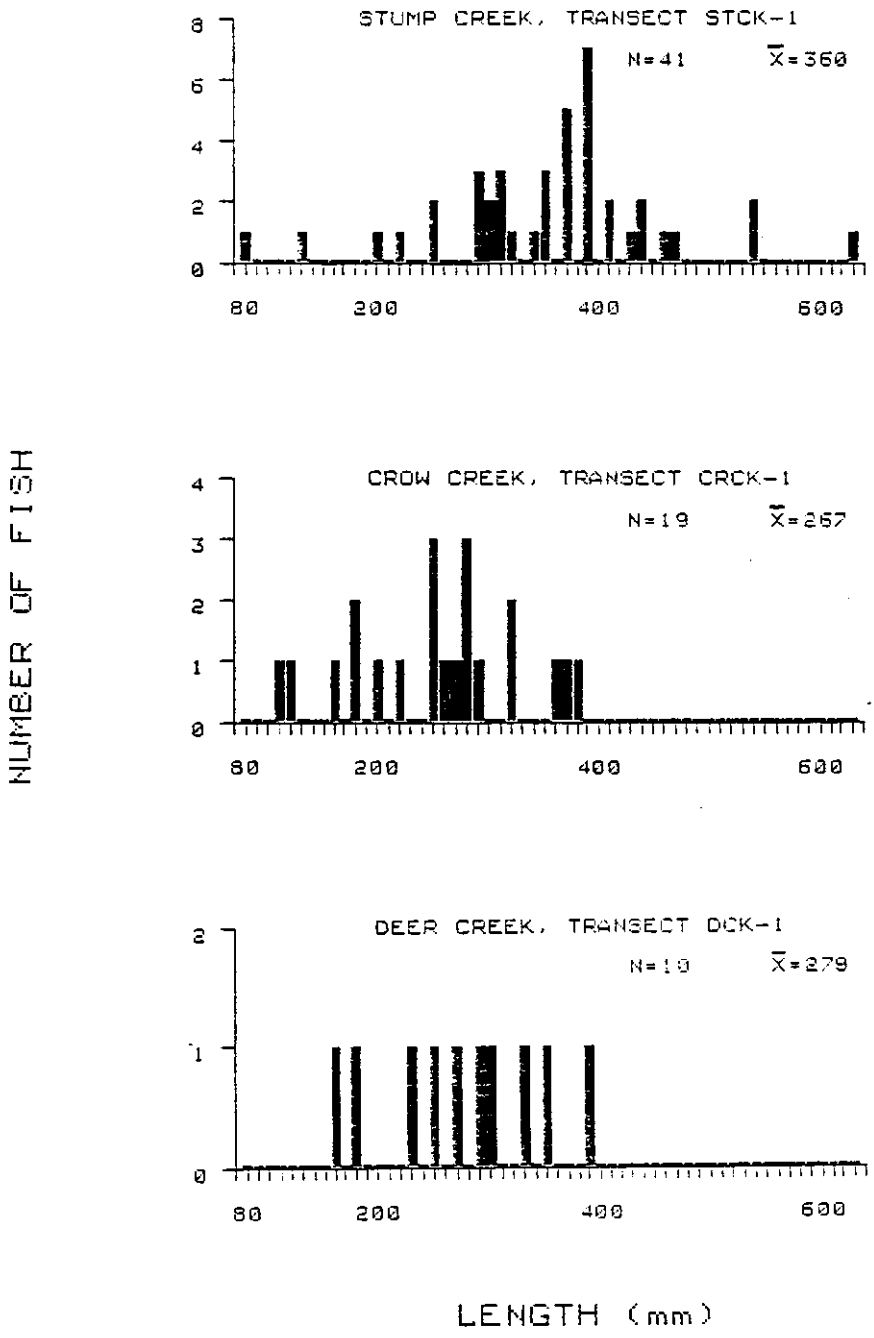

Figure 7. Length distribution of brown trout in Salt River tributaries, Fall 1986.

Table 7. Results of brown trout spawning ground surveys on Stump and Crow creeks, October 20 to 24, 1986.

Stream	Boundary description	Km surveyed	Number of spawners		Number of redds	
			Total	Fish/km	Total	Redds/km
N. Fk. Sage Creek	Southern boundary of Twp. 9S, Rge. 45E, Sec. 8 to forest boundary	1.9	0	0	0	0
N. Fk. Sage Creek	Mouth to headwater springs	0.8	7	9	21	26
Stump Creek	Bridge at Horse Creek to 2nd fence above forest boundary	0.8	2	3	10	13
Stump Creek	Road crossing in stream to mouth of Boulder Creek	2.4	0	0	2	0.8
Crow Creek	From Forest Service exclosure	1.0	0	0	10	10
						mean=10

Table 8. Estimated angler effort (hours) by sections during two-week census intervals, upper Portneuf River, 1986.

Interval	Beginning date	Sections 1	2	3	Total hours
1	May 25	1,041	504	92	1,637
2	June 7	1,159	939	99	2,197
3	June 21	1,275	630	78	1,983
4	July 5	1,271	744	34	2,049
5	July 19	302	472	0	774
6	August 2	441	504	52	997
7	August 16	289	455	28	772
8	August 30	396	170	24	590
TOTAL	May 25-Sept. 12	6,174	4,418	407	10,999

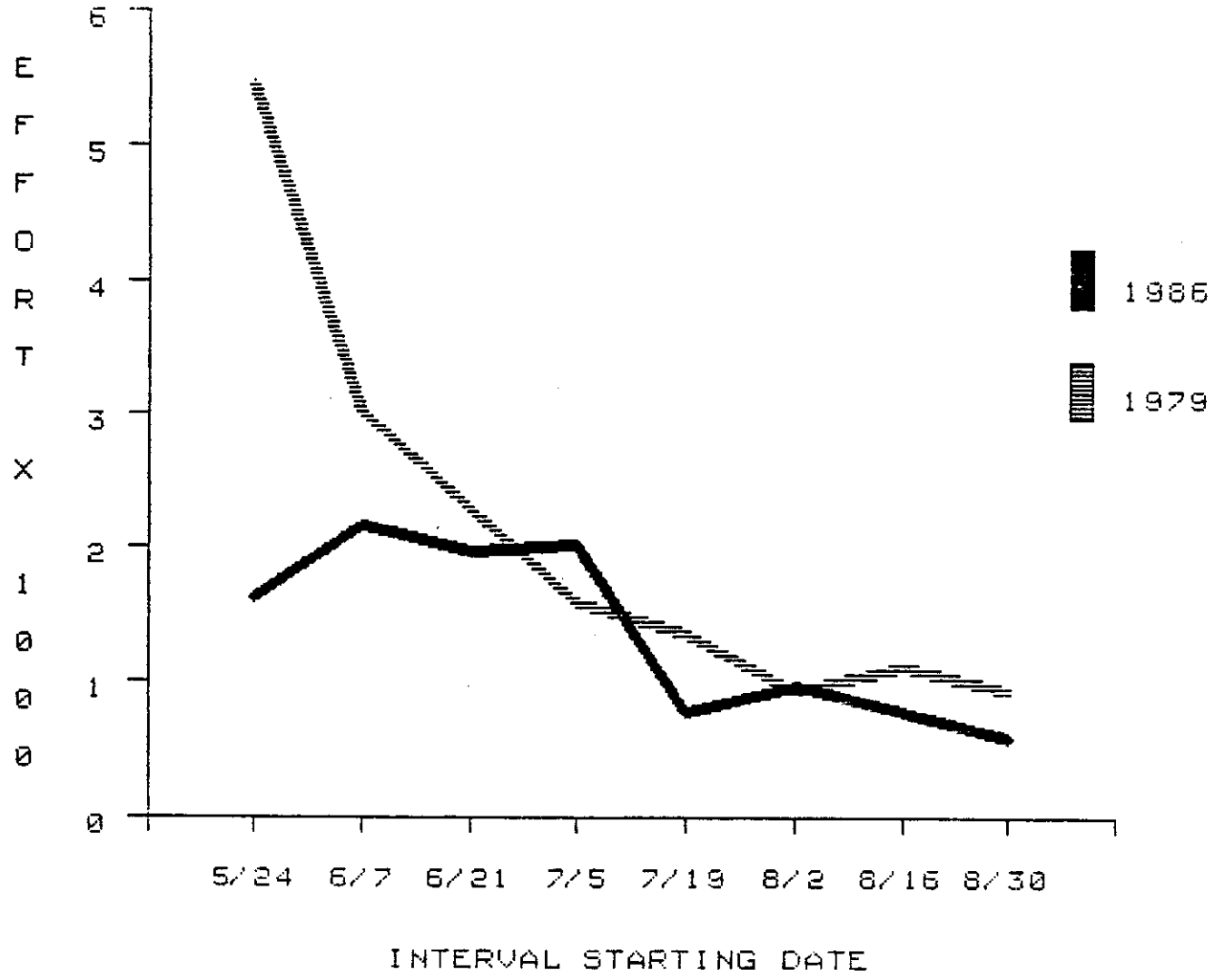

Figure 8. Estimated angler effort (hours) on the upper Portneuf River by two-week intervals in 1986 and 1979 (Heimer 1980).

Table 9. Number of upper Portneuf River anglers by sections and terminal gear types, May 24 to September 12, 1986. Numbers in parentheses equal percents.

Sections	Angler types			Total
	Bait	Lure	Fly	
1	629(77)	126(16)	57(7)	812
2	388(77)	55(11)	62(12)	505
3	42(84)	6(12)	2(4)	50
Total	1,059(77)	187(14)	121(9)	1,367

Anglers expended 56% of the total river effort (6,174 hours) in Section 1 (Lava Hot Springs to Pebble Creek), which comprised 46% of the total study area. This section received 351 angler hours/km of effort during the census period, a figure intermediate between levels observed in sections 2 and 3 (Table 10). Effort was greatest during late June and declined rapidly by mid-July. Lure fishermen represented a greater percentage of anglers in this section (16%) than in the other two sections. Bait and fly fishermen comprised 77% and 7% of the anglers, respectively.

Section 2, Pebble Creek to Kelly Bridge (8 km), received 4,418 hours of angler effort. Portneuf River anglers expended 402 of their effort on this section, which comprised 20% of the river being censused. Effort per unit stream length was 552 hours/km, well above levels on other stream segments. Angler effort peaked during the second interval, but did not decline as rapidly in late July and August as did use in Section 1. Fly fishing was more common in this segment of the river than any other (12%) with lure and bait fishermen comprising 11% and 77%, respectively.

Anglers fished an estimated 407 hours in Section 3, or 4% of the total hours expended on the entire study area in 1986. Effort per river km (32 hours) was well below estimates for the remainder of the river because of poor habitat conditions and low trout densities in the canal. Bait fishermen comprised a higher percentage of anglers (84%) than in other river segments, while fly fishermen were less numerous (4%).

Catch and Harvest

Anglers on the upper Portneuf River caught an estimated 8,201 game fish between May 24 and September 12 and harvested 5,125 (62%) of these fish (Table 11). Section 2 sustained the highest level of angler catch and harvest, 442 and 270 fish/km, respectively. Trout harvest from Section 3 was virtually nonexistent (16 fish/km), while Section 1 sustained intermediate levels (156 fish/km).

Hatchery rainbow were the most commonly caught fish on the river with 3,851 harvested, or 75% of the total harvest. This is a much larger percentage of the harvest than that reported by Heimer (1980) for the 1979 season (49%). Hatchery trout in the creel ranged from 180 mm to 430 mm and averaged 257 mm (Fig. %). Hatchery rainbow trout catch fluctuated from .19 to .43 fish/hr on an interval basis, but averaged .35 fish/hr for the entire census period. In general, these catch rates were quite similar to 1979 levels (Fig. 10).

The overall harvest rate on the river was .48 fish/hr during the entire census period, a figure nearly identical to the .46 rate reported by Heimer (1980). The average angler fishing the Portneuf River caught 1.35 trout (1,890 fish/1,397 anglers).

A breakdown of Portneuf River anglers by terminal gear indicates that bait anglers caught .66 fish/hr, harvested .48 fish/hr and released 27% of their catch (Table 12). Lure fishermen enjoyed the highest catch rate on the river, harvested . 37 fish/hr and released 60%. Fly fishermen caught .93 fish/hr, harvested .26 fish/hr and released 73% of those fish caught.

Table 10. Estimated catch, harvest and effort (hours) per river km by section, upper Portneuf River, May 24 to September 12, **1986.**

Section	(Beginning At)	Km	Effort/ km	Wild trout harvest/km	Hatchery trout harvest/km	Total trout harvest/km	Total trout[a] caught/km
1	Highway 30	17.6	351	42	114	156	250
2	Pebble Creek	8.0	552	56	214	270	442
3	100 m above Kelly Bridge	12.8	32	6	10	16	21
Total study area		38.4	286	33	100	133	214

[a]All fish caught (includes fish harvested and released).

Table 11. Estimated catch rates, harvest composition and terminal gear types by section, upper Portneuf River, May 24 to September 12, 1986.

Species	Harvest data	Census section 1	2	3	Total
WCT	H[a]	528	288	56	872
WRB	H	216	161	25	402
HRB	H	2,013	1,714	124	3,851
	Released[b]	1,644	1,373	59	3,076
Total	H	2,757	2,163	205	5,125
	C[c]	4,401	3,536	264	8,201
Terminal gear					
Bait	H	2,188	1,770	148	4,106
	C	2,980	2,396	172	5,548
Lure	H	708	222	0	730
	C	1,250	573	0	1,823
Fly	H	116	96	0	212
	C	365	426	0	791

[a]H = Fish harvested (those kept by anglers).
[b]Includes all species caught and released.
[c]All fish caught (includes fish harvested and released).

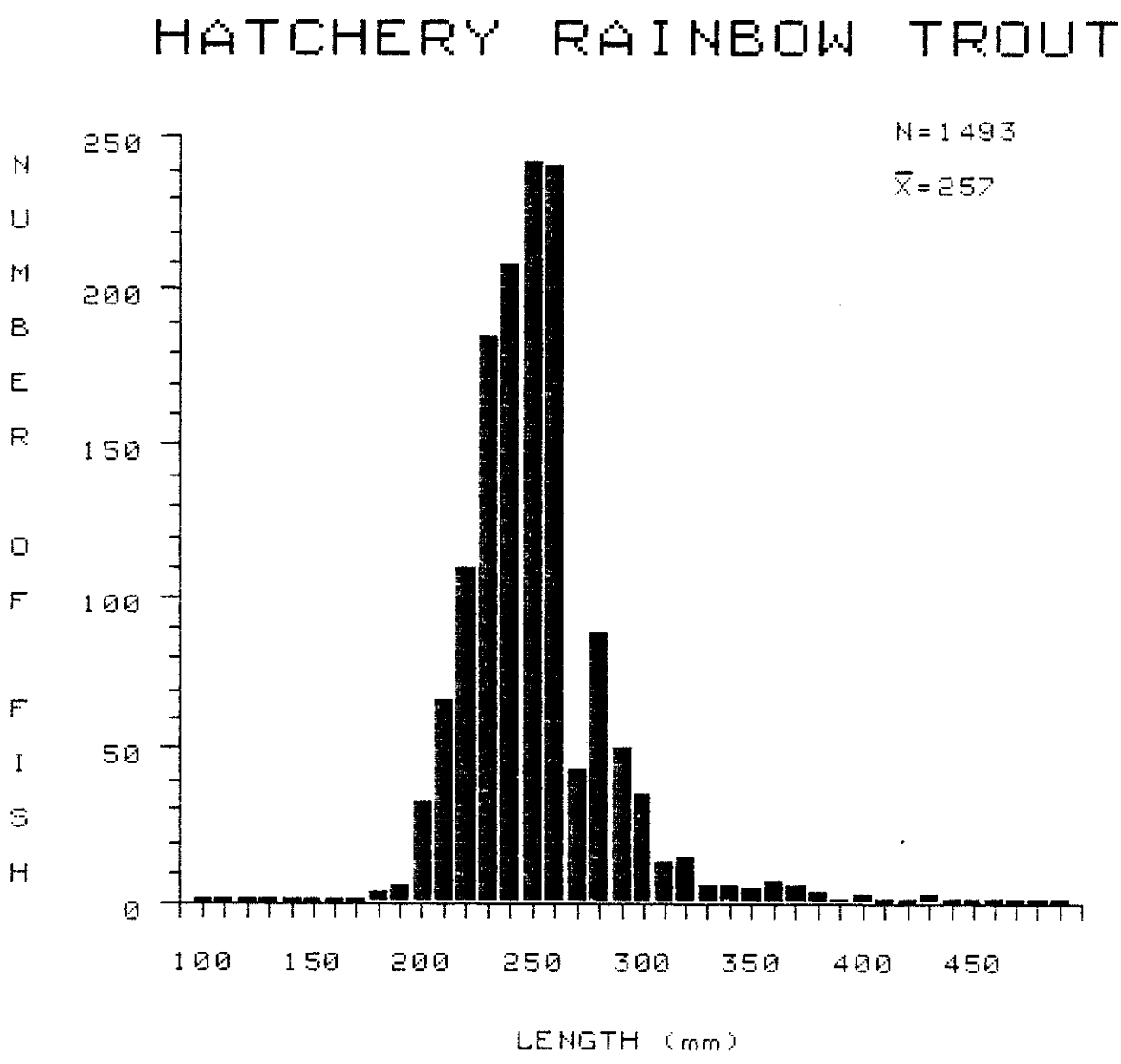

Figure 9. Length frequency of hatchery rainbow trout in angler creels, upper Portneuf River, 1986.

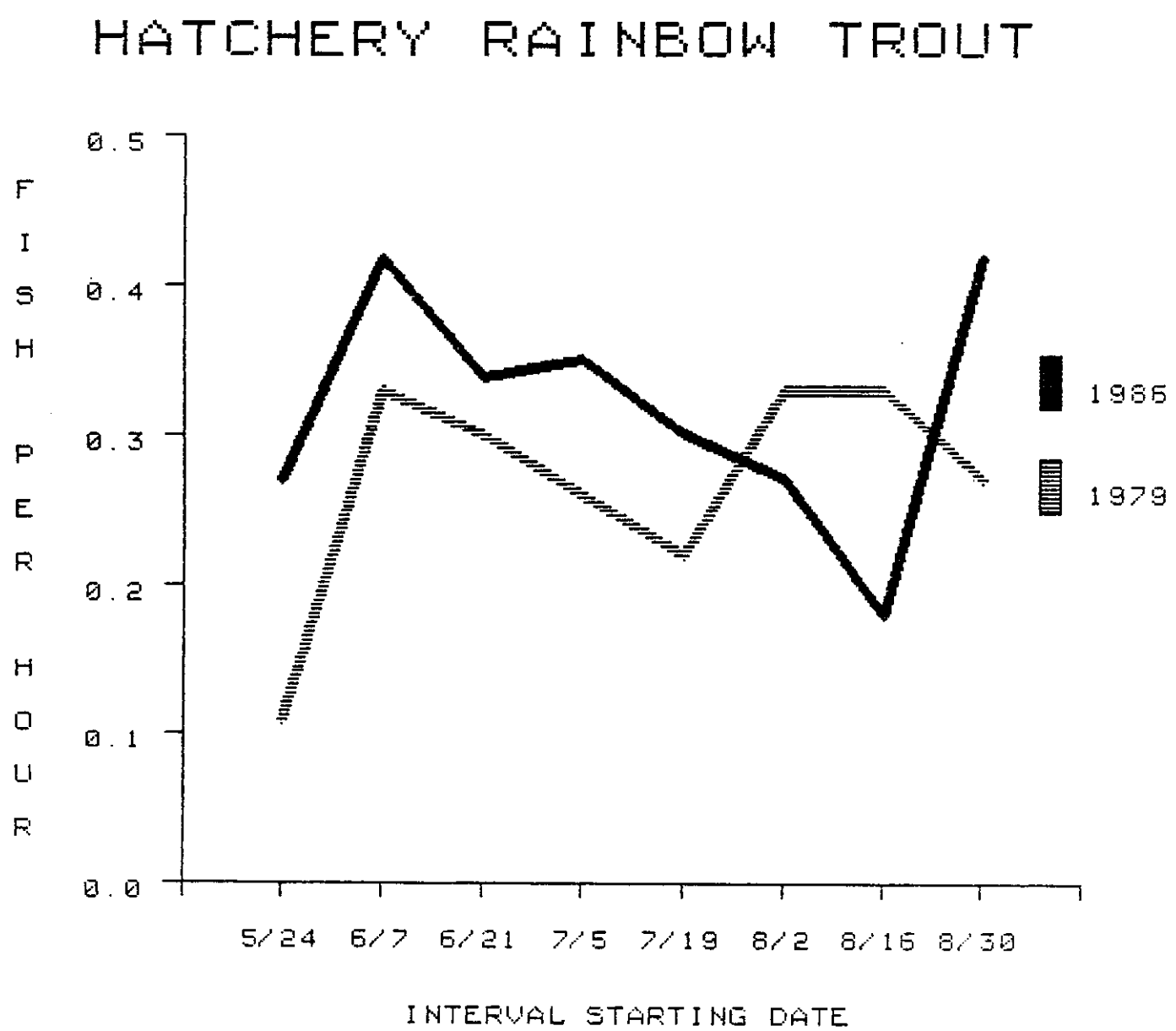

Figure 10. Catch rates (fish per hour) for hatchery rainbow trout, upper Portneuf River, from 24 May through 14 September, 1979 and 1986.

Table 12. Catch rates for wild cutthroat (WCT), wild rainbow (WRB), hatchery rainbow trout (HRB) and terminal gear types, upper Portneuf River, May 24 to September 12, **1986.**

Species	Harvest data	Census sections 1	2	3	Total
WCT	H[a]	.09	.07	.14	.10
WRB	H	.03	.04	.06	.04
HRB	H	.33	.39	.30	.34
	Released[b]	.27	.31	.14	.24
Total	H	.45	.50	.50	.48
	C[c]	.71	.80	.65	.72
Terminal gear					
Bait	H	.46	.50	.46	.48
	C	.64	.71	.54	.66
Lure	H	.36	.39	.25	.37
	C	1.03	1.13	.25	1.03
Fly	H	.34	.20	0	.26
	C	1.05	.86	0	.93

[a]Fish harvested (those kept by anglers).
[b]All fish caught and released.
[c]All fish caught (includes fish harvested and released).

Anglers harvested an estimated 872 wild cutthroat trout during 1986, or 17% of the total harvest. Heimer (1980) reported that cutthroat trout comprised 11% of the total harvest in 1979. Cutthroat trout in the creel ranged from 150 mm to 445 mm in length and averaged 278 mm (Fig. 11).

The season long harvest rate for cutthroat trout was .10 fish/hr. The cutthroat trout harvest in 1986 was greater than that observed during the 1979 census in all but one two-week interval (Fig. 12).

Wild rainbow trout comprised the smallest portion of the total harvest (8%) with an estimated 402 creeled. Wild rainbow were more prevalent in 1979 when they comprised 36% of the total harvest (Heimer 1980). Wild rainbow in the creel ranged from 110 mm to 549 mm and averaged 288 mm in total length (Fig. 13). The overall catch rate for wild rainbow in 1986 was .04 and ranged from .01 fish/hr to .06 fish/hr. These rates are well below 1979 levels (Fig. 14). In general, fishing success for wild rainbow peaked during the first three intervals and declined during the remainder of the season.

Angler Residence and Opinion

Idahoans comprised 89.2% of all anglers interviewed on the upper Portneuf River during 1986. Bannock County residents were by far the most numerous, making up 82.6% of the resident anglers. Nonresidents from 19 states represented 10.8% of the anglers interviewed, of which Utah residents were the most numerous (95.6%) (Table 13).

The angler opinion survey was conducted primarily to assess anglers' perceptions of the present fishery. Forty percent of 1,339 anglers interviewed rated the fishing poor during 1986, while 29% and 31% rated fishing good and fair, respectively (Table 14). The majority of respondents (57%) fished Portneuf River seven times or less per year, but 18% reported fishing the river 22 or more times a year.

Nearly half of the anglers interviewed (46%) chose not to venture an opinion on the trend in fishing during the last 10 years. Of those anglers with an opinion, there was no definite pattern with 15%, 17% and 23% responding that fishing had improved, declined, or stayed the same, respectively.

Cutthroat trout were preferred over rainbow trout nearly 2:1 by Portneuf River anglers. However, extensive hybridization has occurred in the Portneuf River and the ability of anglers to distinguish between relatively pure forms of these species is unknown.

Approximately equal numbers of anglers were satisfied and dissatisfied with the size of the fish caught in 1986, .37% and 412, respectively. Similar results were obtained in regard to fish abundance.

Forty-five percent of those anglers questioned would favor more restrictive regulations if such a program would benefit the fishery in terms of fish size or numbers. We did not specify what type of regulations, but instead gave anglers several examples during the interviews, such as reduced bag limits, or a minimum size limit. Thirty-one percent would not favor such a program, while 25% did not have an opinion.

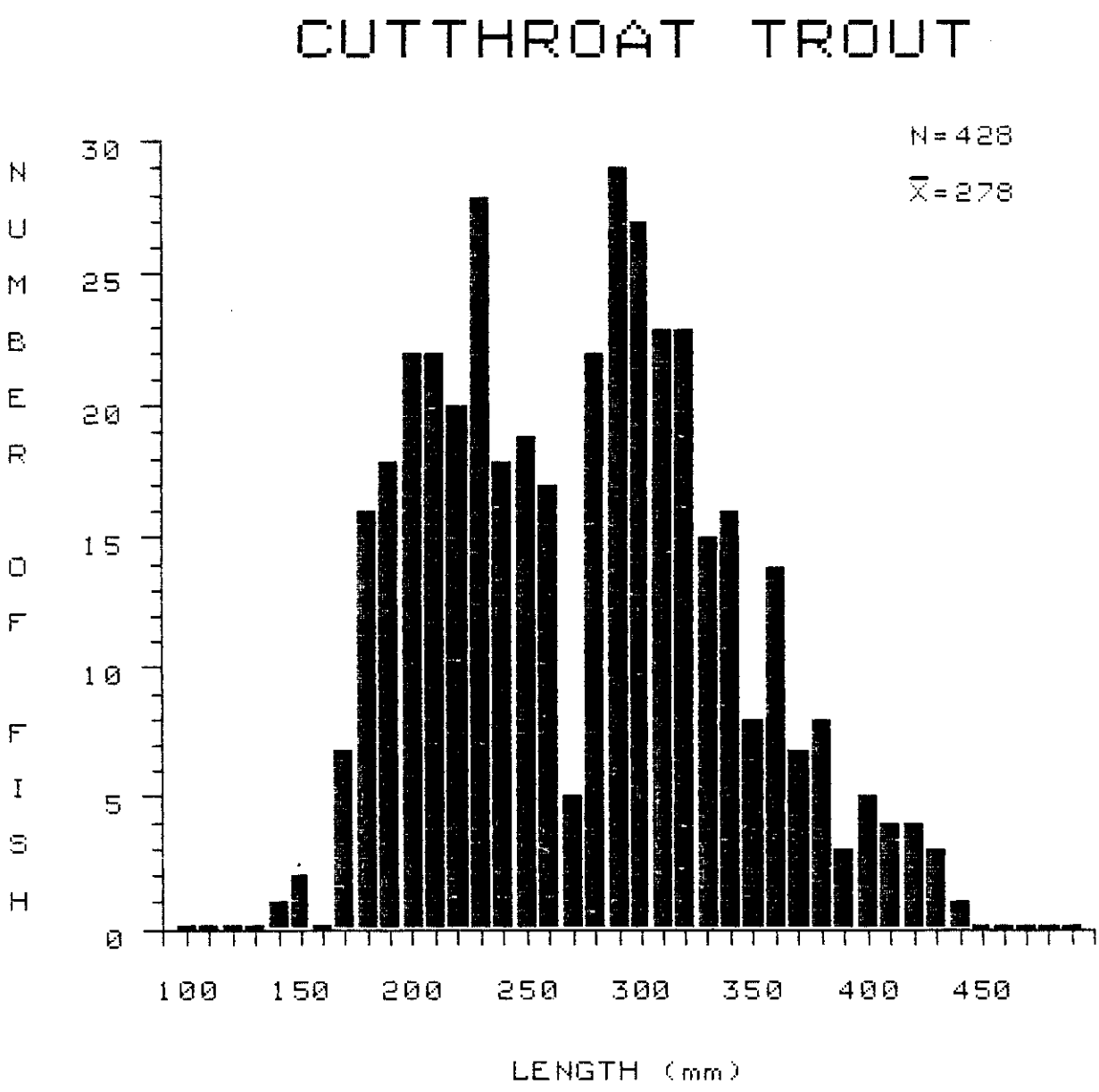

Figure 11. Length frequency of wild cutthroat trout in angler creels, upper Portneuf River, 1986.

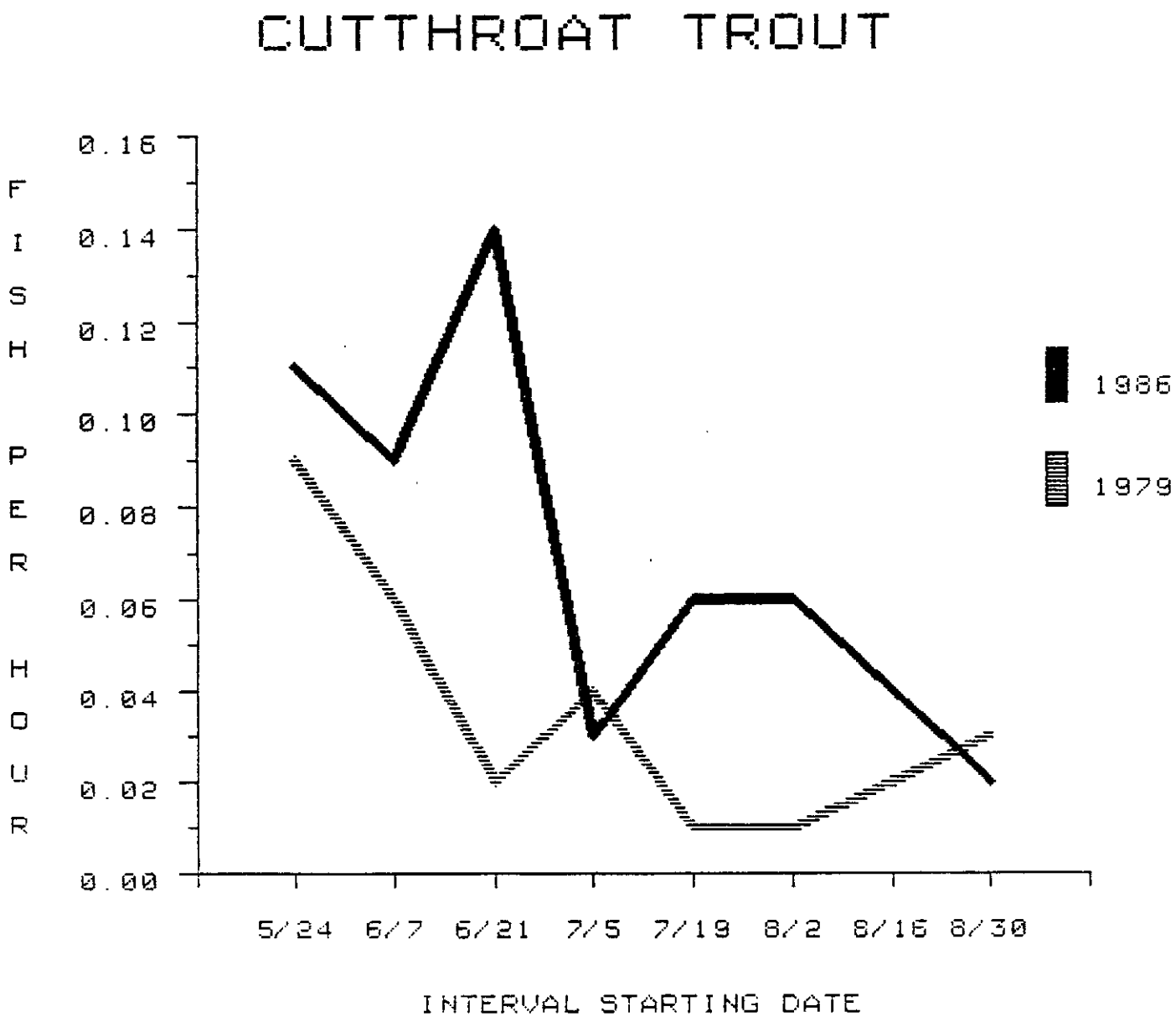

Figure 12. Catch rates for wild cutthroat trout, upper Portneuf River, 24 May to 14 September, 1979 and 1986.

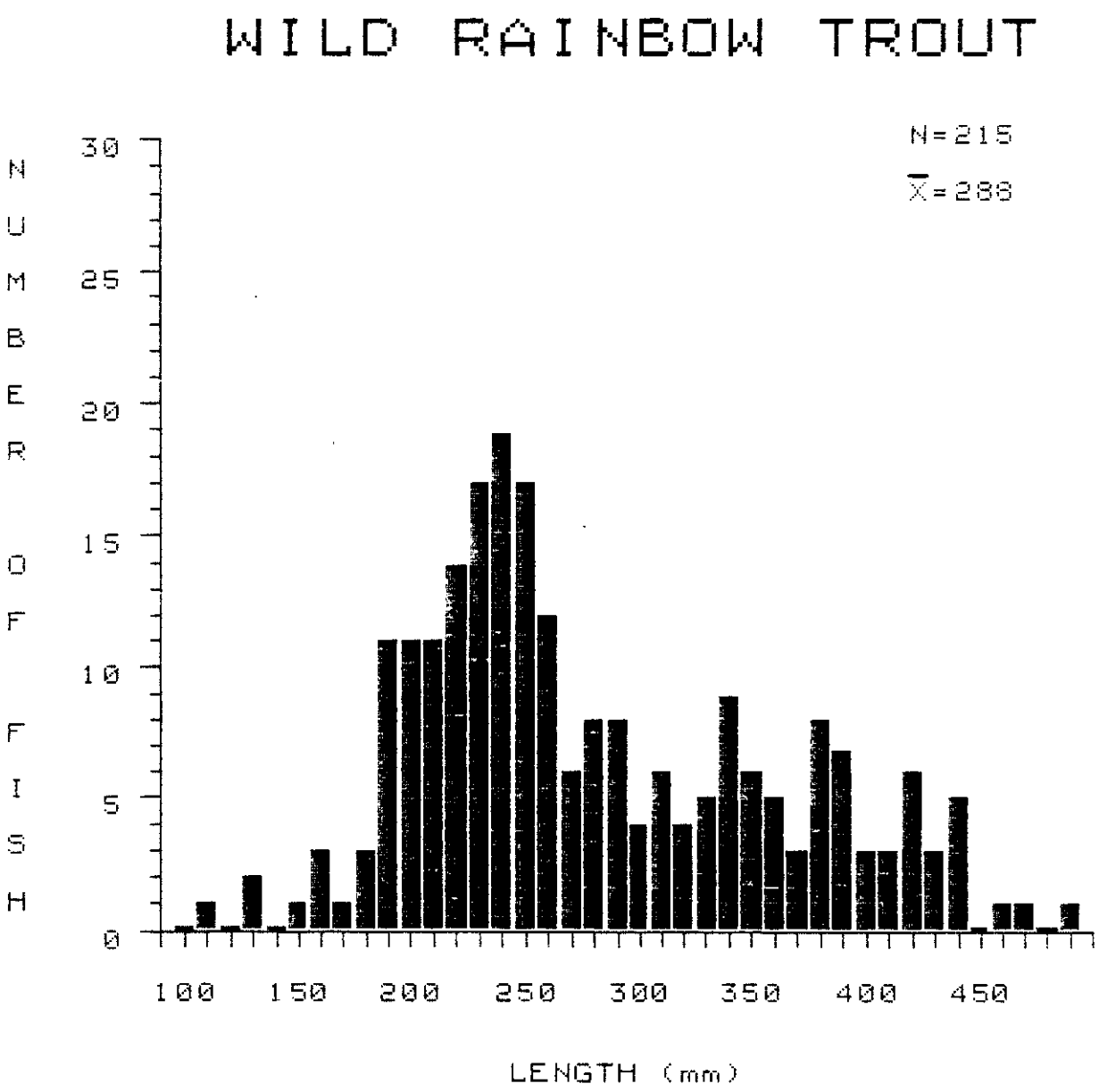

Figure 13. Length frequency of wild rainbow trout in angler creels, upper Portneuf River, 1986.

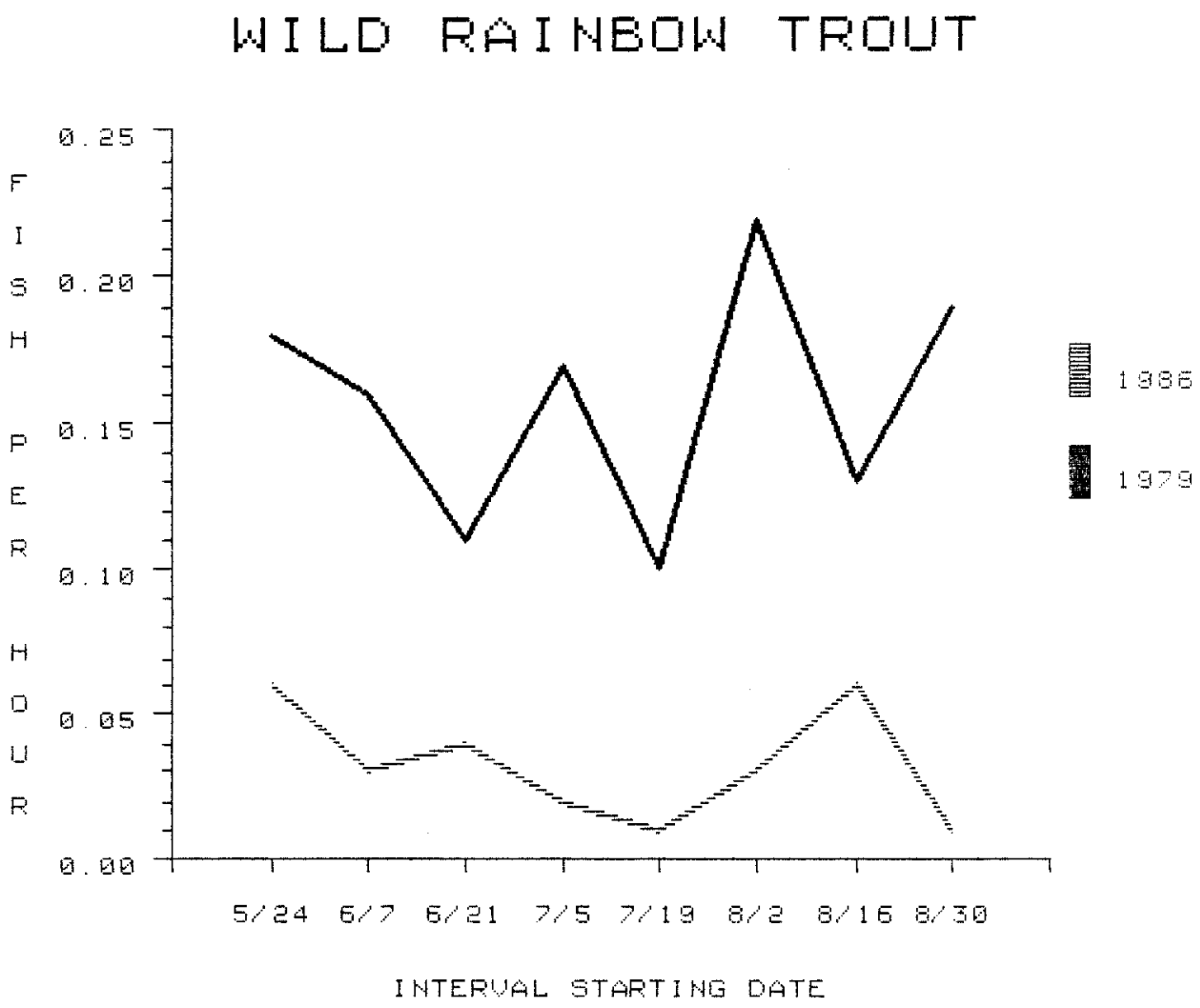

Figure 14. Harvest rates (fish per hour) for wild rainbow trout, upper Portneuf River, 1979 and 1986.

Table 13. Number *of residents and counties represented and* number *of nonresidents and states* represented, upper *Portneuf River,* 1986.

Resident counties	Percent	Number	Nonresidents	Percent	Number
Ada	0.9	12	Alaska	0.1	1
Bannock	82.6	1,158	Arizona		8
Bingham	1.5	21	California	1.3	18
Bonneville	1.3	18	Colorado	0.3	4
Boundary	0.1	2	Hawaii	0.1	1
Camas	0.1	2	Iowa	0.1	2
Canyon	0.1	1	Kansas	0.5	7
Caribou	0.4	5	Michigan	0.1	1
Cassia	0.1	2	Minnesota	0.1	2
Franklin	0.6	9	Montana	0.1	2
Minidoka	0.7	10	Nevada		8
Power	0.5	7	New York	0.1	2
Twin Falls	0.3	4	Ohio	0.1	2
			Oregon	0.4	5
			Pennsylvania	0.1	1
			Utah	5.6	78
			Washington	0.3	4
			Wisconsin	0.1	1
			Wyoming	0.3	4
Total	89.2	1,251		10.8	151

Table 14. Angler responses to opinion survey questions, upper Portneuf River, 1986.

1. How would you rate the fishing today? (n=1,339)

   Good - 29%
   Fair - 31%
   Poor - 40%

2. How many days do you fish the Portneuf each year? (n=1,281)

   1-7 - 57%
   8-21 - 25%
   22+ - 18%

3. How would you rate the recent trend of fishing on the Portneuf? (n=1,268)

   Up - 15%
   Down - 17%
   Same - 23%
   No opinion 45%

4. Which species do you prefer to catch when fishing the river? (n=1,186)

   Cutthroat - 40%
   Rainbow - 22%
   No opinion - 38%

5. Are you satisfied with the present fishery in terms of: (n=1,673)

   a) Size--yes - 37%
      no - 38%
      no opinion - 25%

   b) Abundance of fish - yes - 40%
      no - 35%
      no opinion - 25%

6. If more restrictive regulations benefited the fishing in terms of fish numbers and/or size, would you favor these regulations? (n=1,241)

   Yes - 44%
   No - 31%
   No opinion - 25%

Population Monitoring

Lava Hot Springs. Two recapture runs were made on the lower section. The Schnabel method yielded a total population estimate of 822 fish including 534 wild rainbow trout, 189 brown trout and 99 cutthroat trout (Table 15). The total number of fish present in 1986 was similar to estimates obtained the past two years.

In regard to individual species estimates, the 1986 wild rainbow trout population was nearly identical to last year's estimate (Fig. 15). However, considerable shifts in cutthroat and brown trout abundance occurred. The 1986 estimate of brown trout abundance (189 fish) was over twice as great as the 1985 estimate (Fig. 16), while the cutthroat trout estimate declined by 40% (Fig. 17).

The mean total lengths of wild rainbow, brown, and cutthroat trout collected in 1986 were 265, 269 and 318 mm, respectively. Mean lengths of individual species sampled in this study section have changed *very* little during the past six years (Figs. 18, 19 and 20).

Steel Bridge to Utah Bridge. We made two recapture runs in this segment of the river. The Schnabel method yielded a total population estimate of 1,537 fish including 634 wild rainbow trout, 620 hatchery rainbow trout and 273 cutthroat trout. The total number of fish present in the study section in 1986 was the highest number observed since shocking began in 1979 (Table 16).

Wild rainbow trout abundance has remained stable the past three years, ranging from 634 to 697 fish (Fig. 21). However, hatchery rainbow abundance in 1986 was nearly three times as great as any reported previously (Fig. 22). The late summer-fall draining of Chesterfield Reservoir for repair work recruited large numbers of hatchery rainbow to the study section prior to our electrofishing activities. Cutthroat trout abundance has remained stable the past three years and has increased substantially since the early 1980s (Fig. 23).

The mean total lengths of wild rainbow, hatchery rainbow and cutthroat trout collected in 1986 were 266 mm, 267 mm, and 316 mm, respectively. Mean lengths of individual species sampled in this section have changed little during the past seven years (Figs. 24, 25 and 26). Mean lengths of wild rainbow and cutthroat trout were nearly identical to those observed for these species in the Lava Hot Springs section located downstream.

Portneuf River Tributaries Assessment

Pebble Creek

Electrofishing stations in the Pebble Creek drainage included three on the main stem and three on tributary streams (Big Springs, North Fork, and South Fork Pebble creeks) (Table 17). Trout densities (TL>90 mm) ranged from <1 fish/100 m^2 on the South Fork Pebble Creek to 31/100 m^2 on Pebble Creek-4 (Table 18).

Table 15. Trout population estimates in an approximate 5-km section of Portneuf River from Center Street Bridge in Lava Hot Springs downstream to the concrete Highway 30 bridge at milepost 369.

Year	Wild rainbow	Hatchery rainbow	Brown	Cutthroat	Total	Confidence limits (95%)[a]
1979	1,290	-	128	-	1,418	±904
1980	872	-	28	18	918	±884
1981	2,369	50	112	5	2,536	±1,061
1982	681	-	27	7	715	±682
1983	3,017	-	95	64	3,176	±3,114
1984	722	4	36	56	818	464-1,579
1985	493	5	73	169	740	453-1,277
1986	534	-	189	99	822	546-1,849

[a]In 1984 and 1985, R was considered as a Poisson variable.

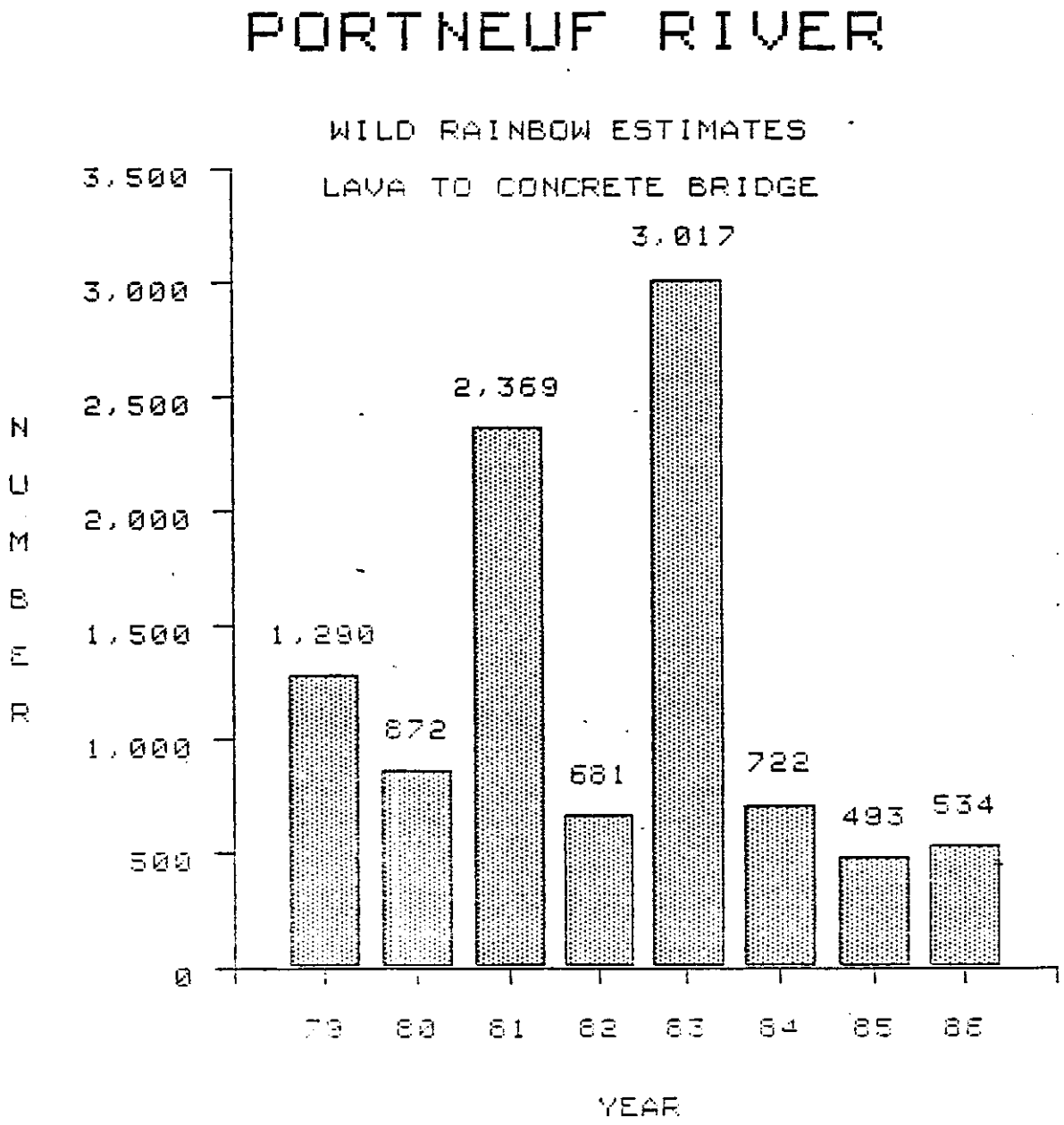

Figure 15. Wild rainbow trout estimates in the lower section of the Portneuf River - from Lava Hot Springs downstream to the Concrete Bridge.

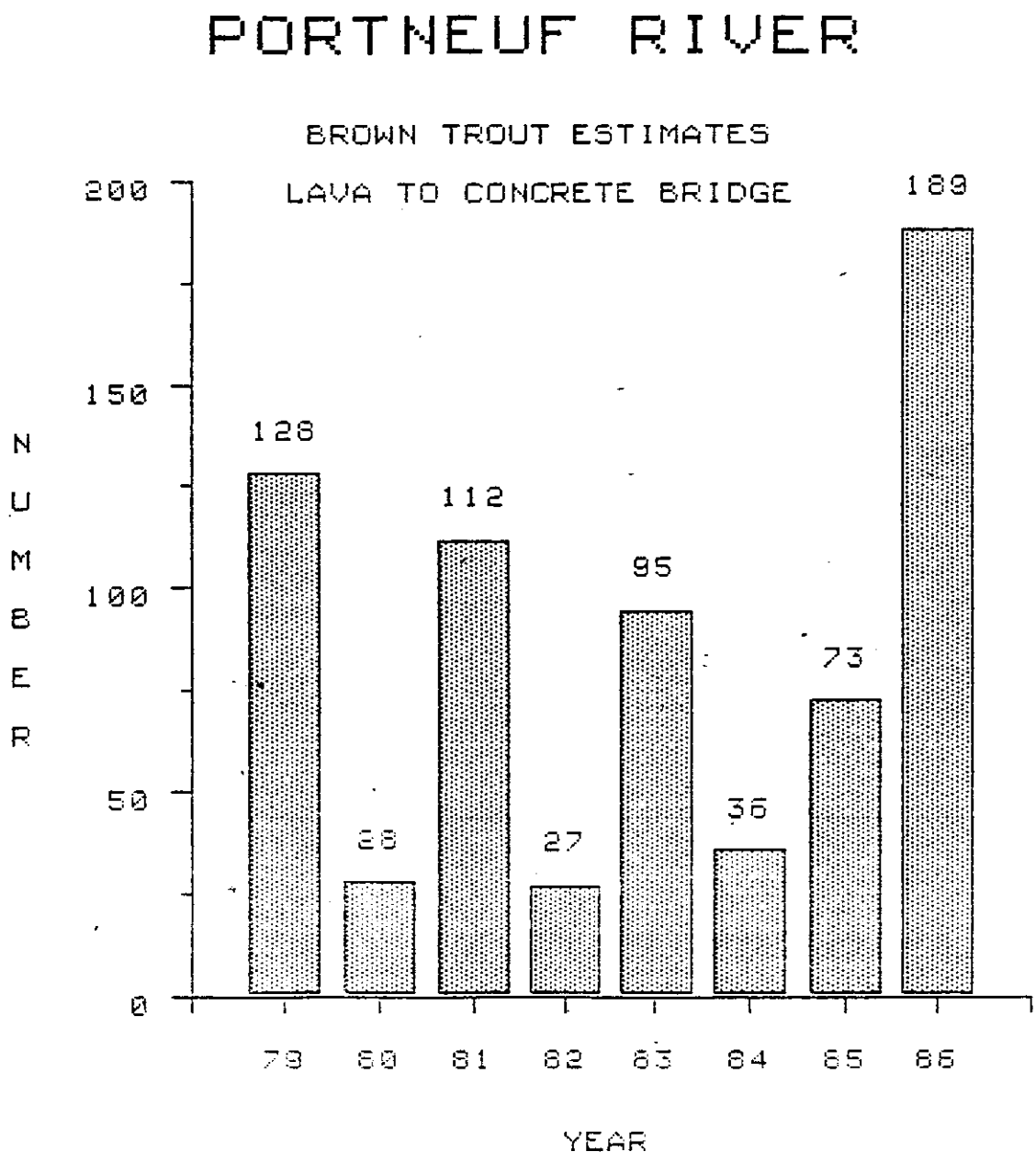

Figure 16. Brown Trout estimates in the lower section of the Portneuf River - from Lava Hot Springs downstream to the Concrete Bridge.

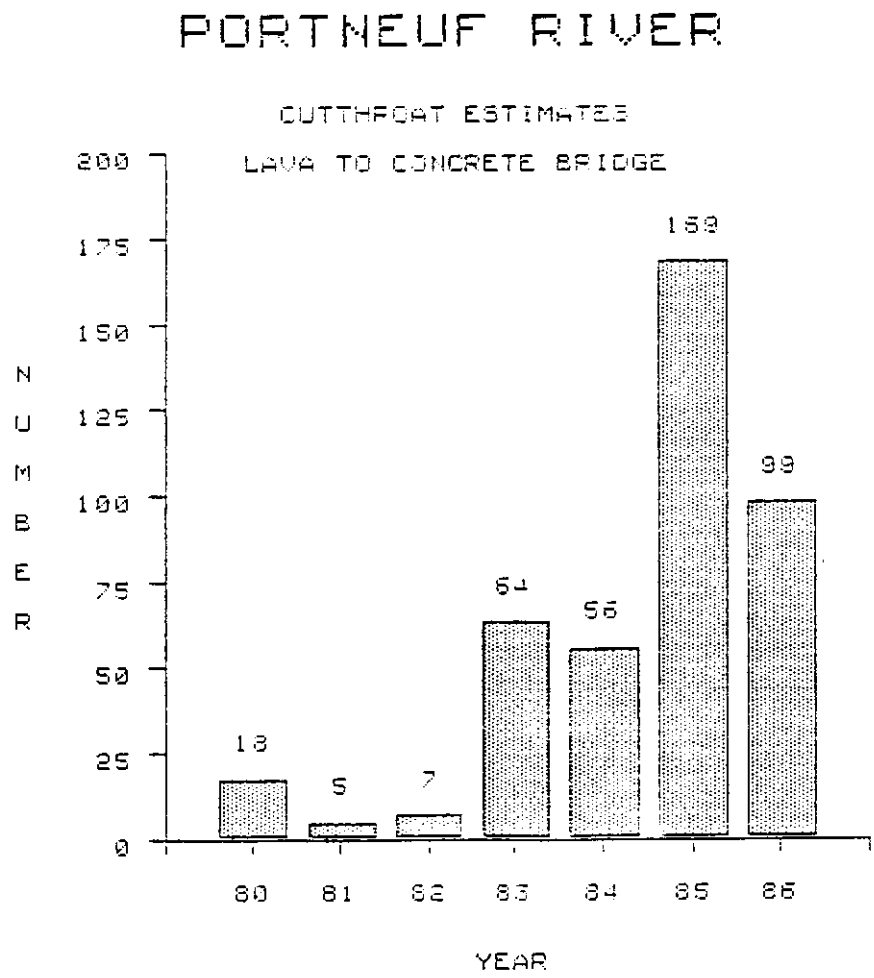

Figure 17. Cutthroat estimates in the lower section of the Portneuf River - from Lava Hot Springs downstream to the Concrete Bridge.

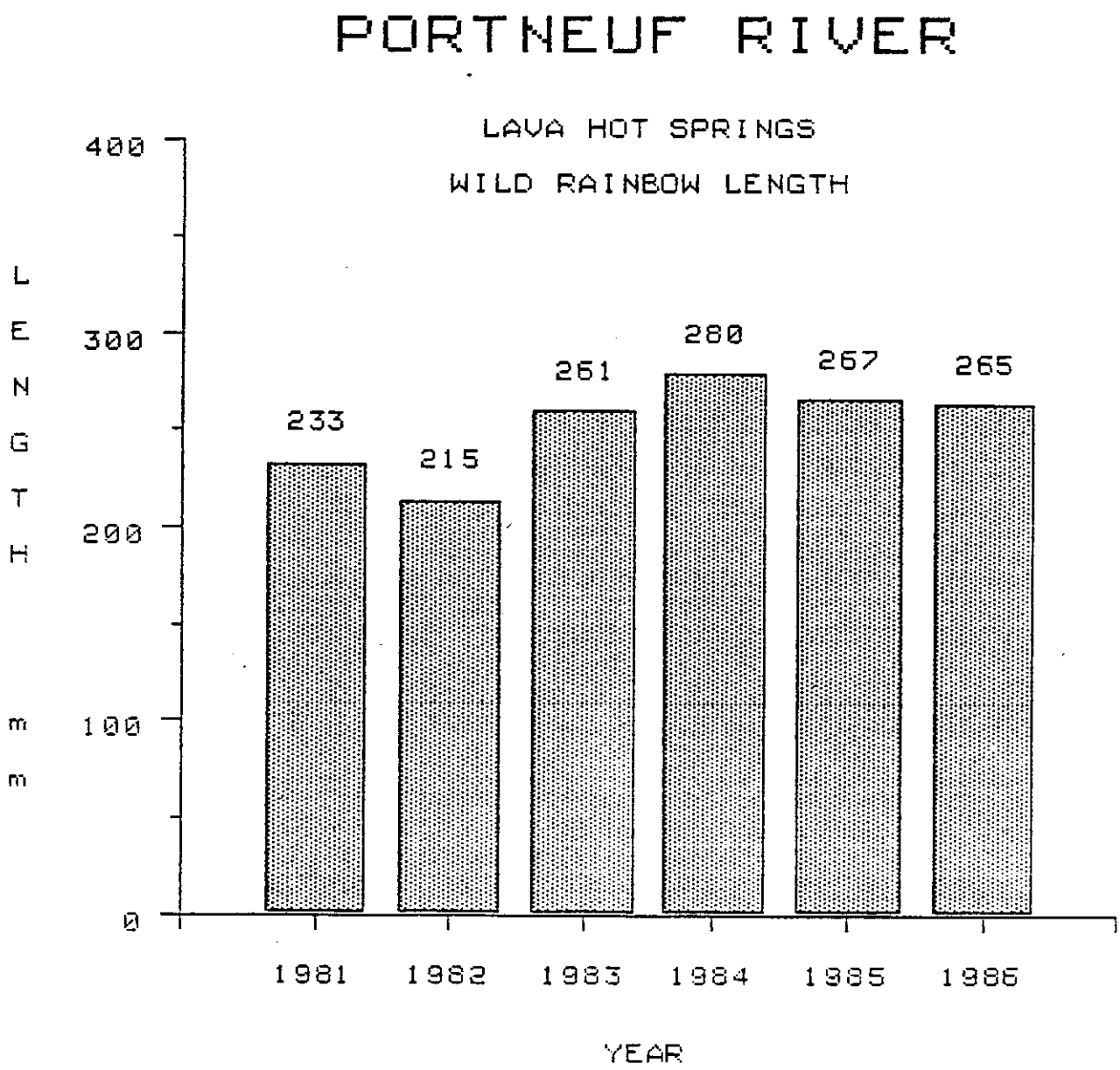

Figure 18. Mean length of wild rainbow on lower section of Portneuf River - downstream to Concrete Bridge.

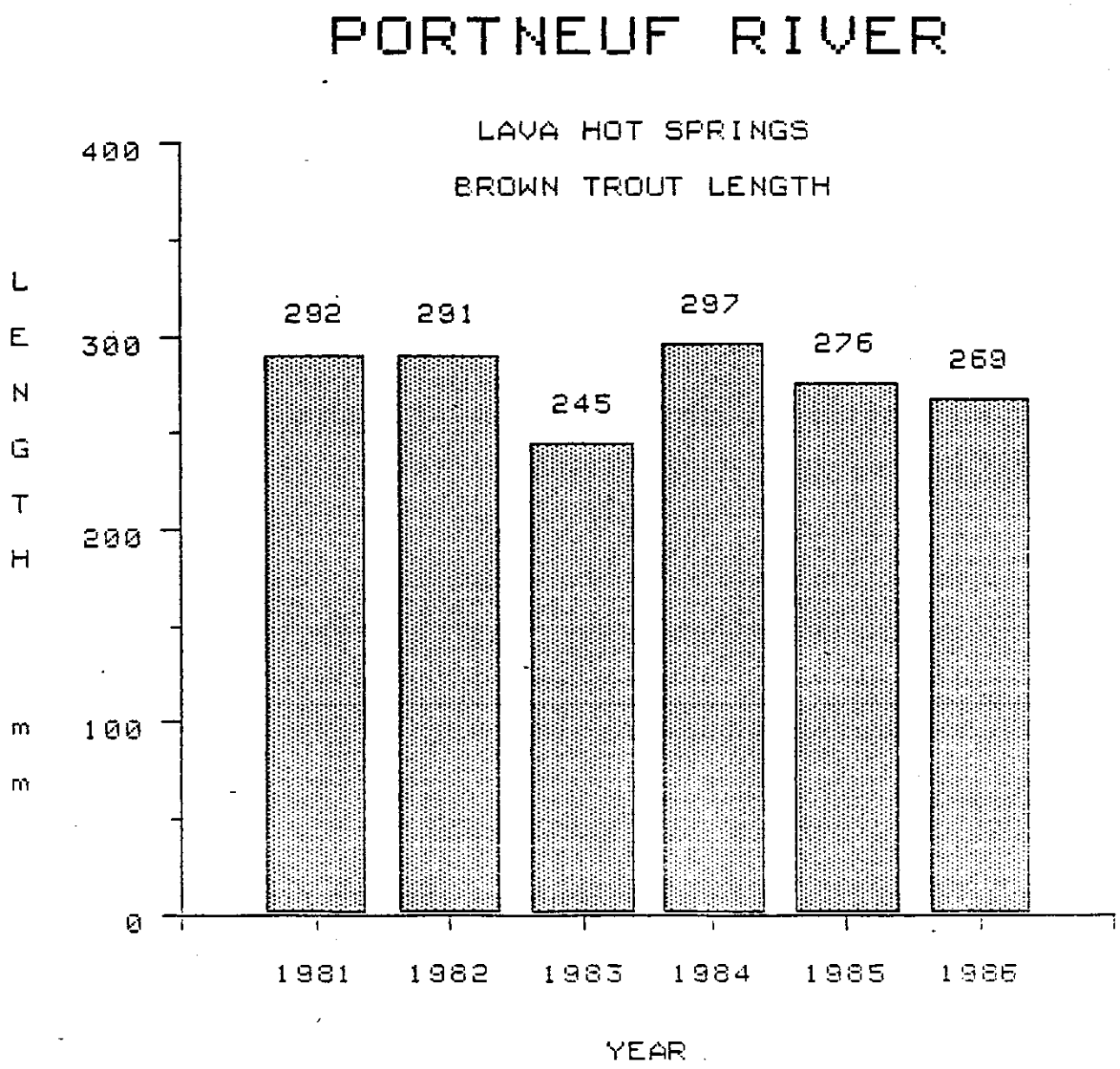

Figure 19. Mean length of brown trout on lower section of Portneuf River - from Lava Hot Springs downstream to the Concrete Bridge.

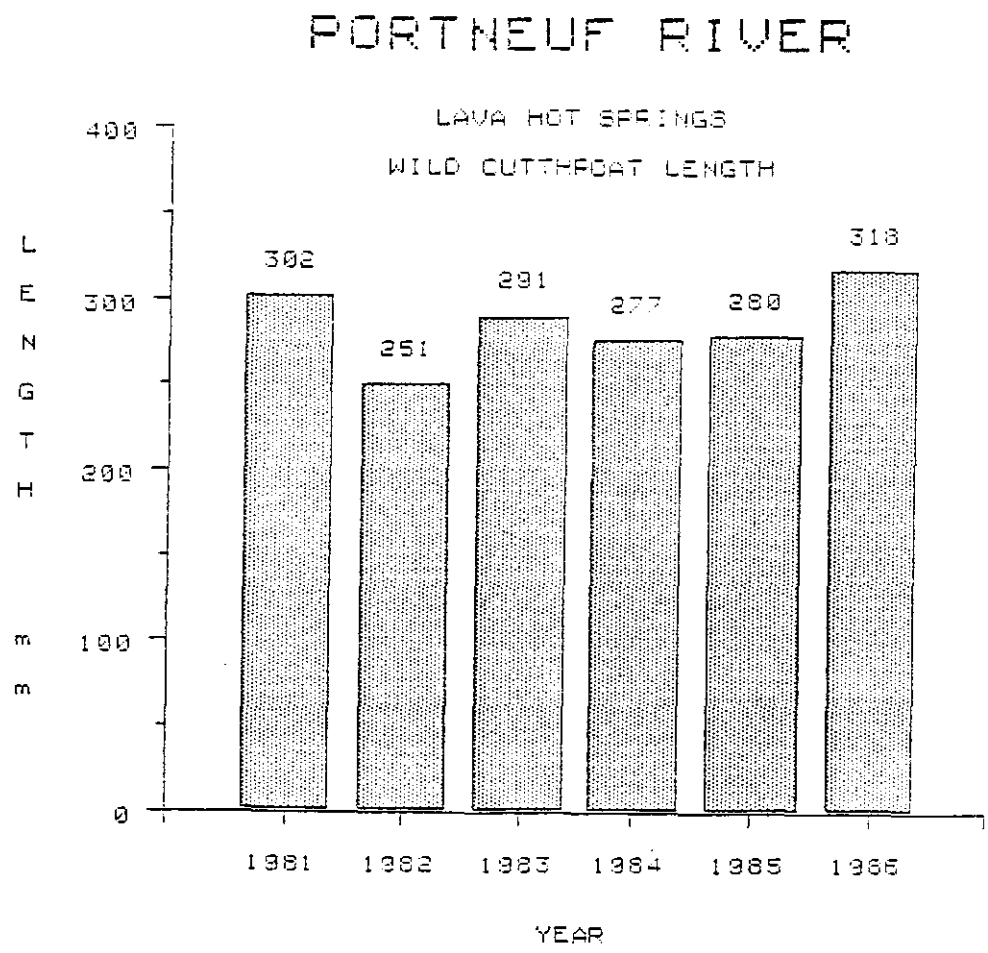

Figure 20. Mean length of wild cutthroat on lower section of Portneuf River - from Lava Hot Springs downstream to the Concrete Bridge.

Table 16. Trout population estimates in an approximate 3-km section of upper Portneuf River from Steel Bridge downstream to Utah **Bridge, 1986.**

Year	Wild rainbow	Hatchery rainbow	Cutthroat	Total	Confidence limits 95%[a]
1979	308	47	22	377	±142
1980	624	104	139	867	±193
1981	185	120	19	324	±105
1982	432	95	100	627	±444
1983	540	200	91	831	±334
1984	668	161	281	1,110	804-1579
1985	697	214	339	1,250	995-1,567
1986	634	620	273	1,537	1,098-2,561

[a]in 1984 and 1985, R was considered as a Poisson variable.

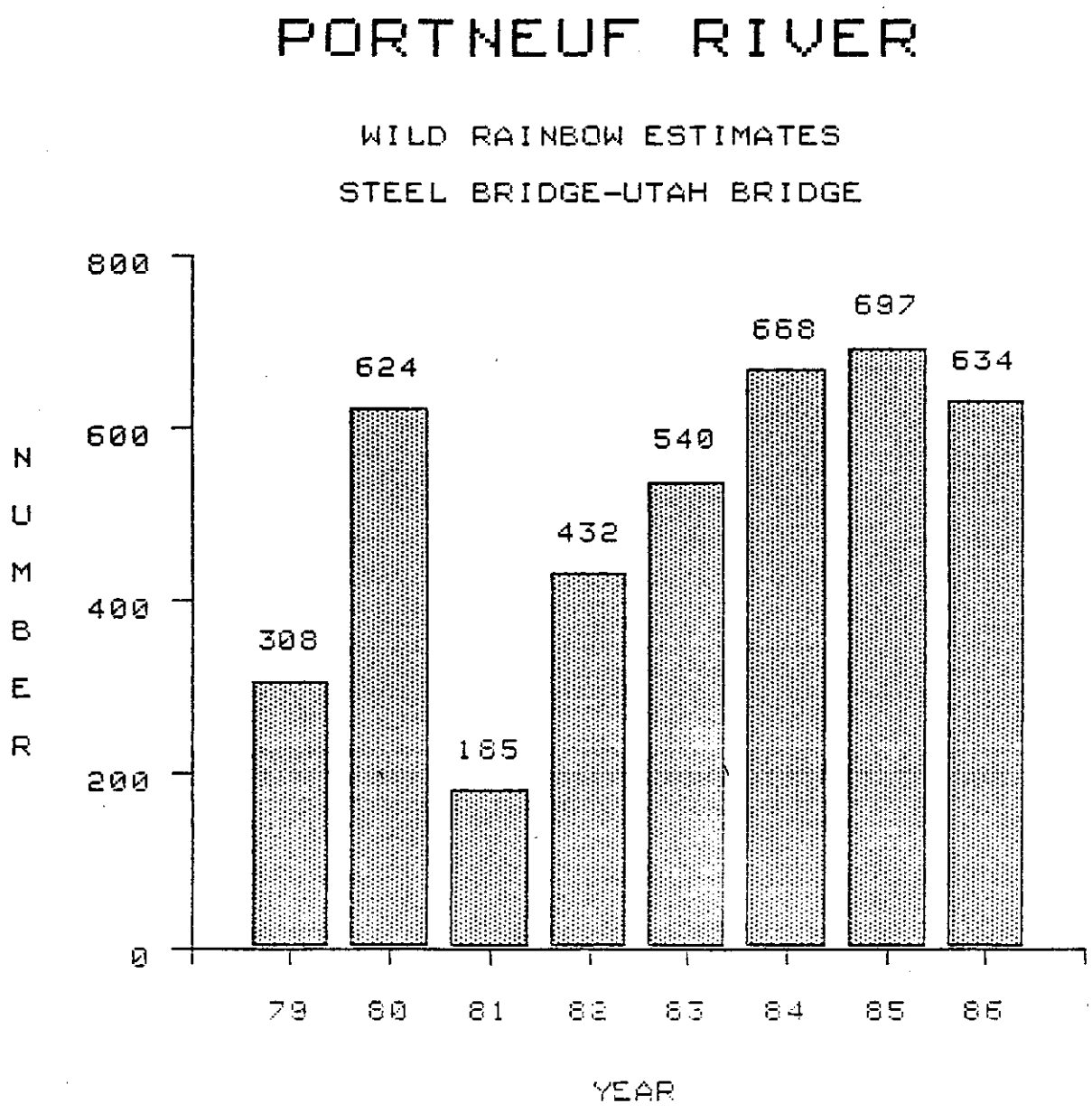

Figure 21. Wild rainbow trout estimates in upper section of the Portneuf River - above Lava Hot Springs from the Steel Bridge downstream to the Utah Bridge.

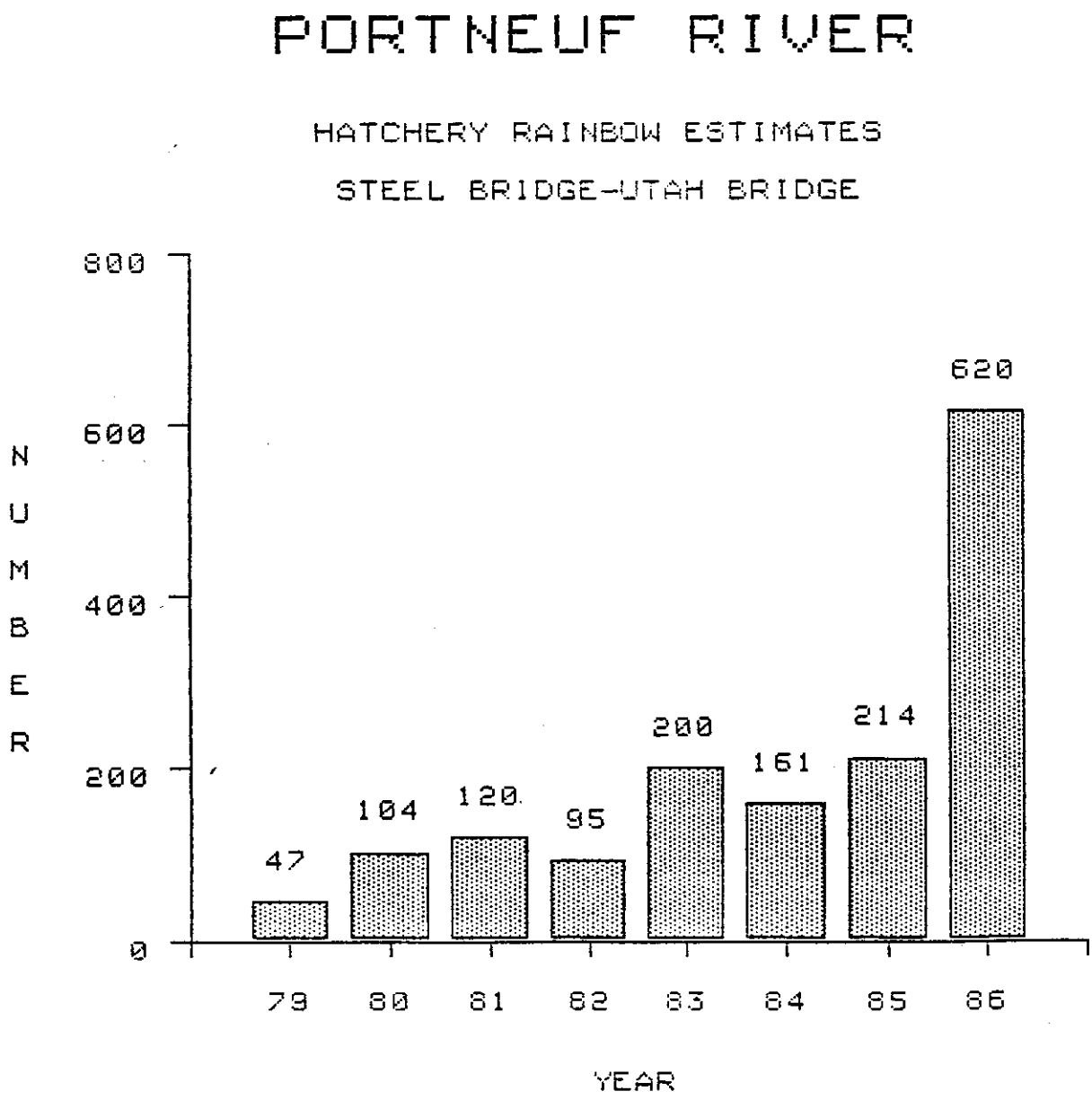

Figure 22. Hatchery rainbow trout estimates in the upper section of the Portneuf River - above Lava Hot Springs from the Steel Bridge downstream to the Utah Bridge.

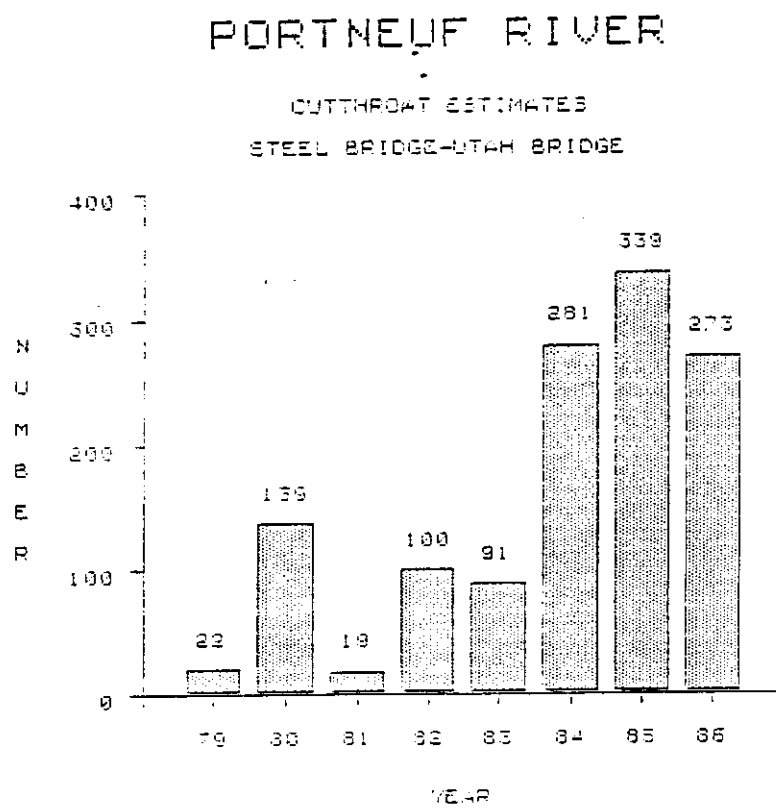

Figure 23. Cutthroat trout estimates in the upper section of the Portneuf River - above Lava Hot Springs from the Steel Bridge downstream to the Utah Bridge.

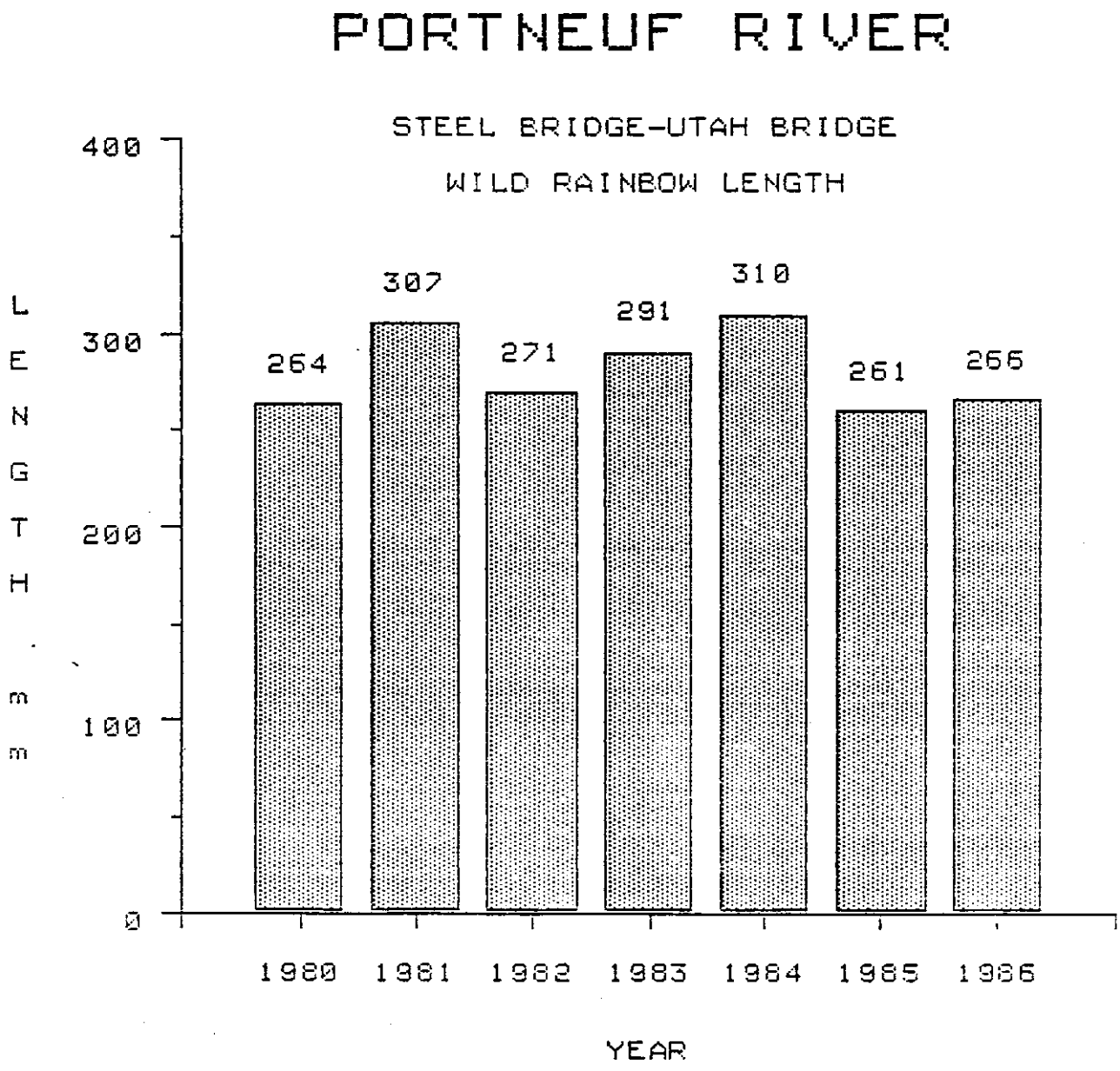

Figure 24. Mean length of wild rainbow trout in the upper section of the Portneuf River, above Lava Hot Springs.

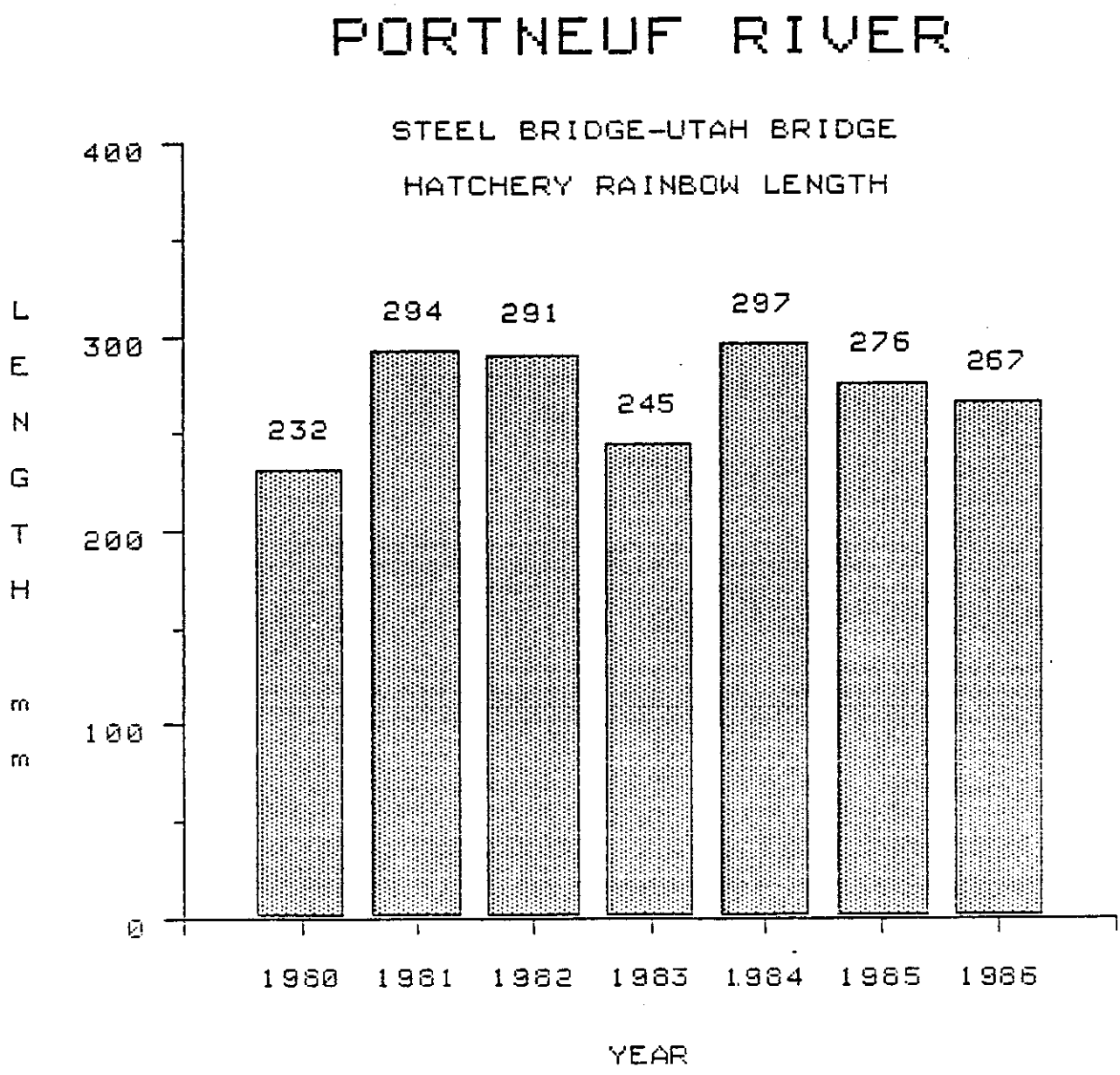

Figure 25. Mean length of hatchery rainbow trout in the upper section of the Portneuf River, above Lava Hot Springs.

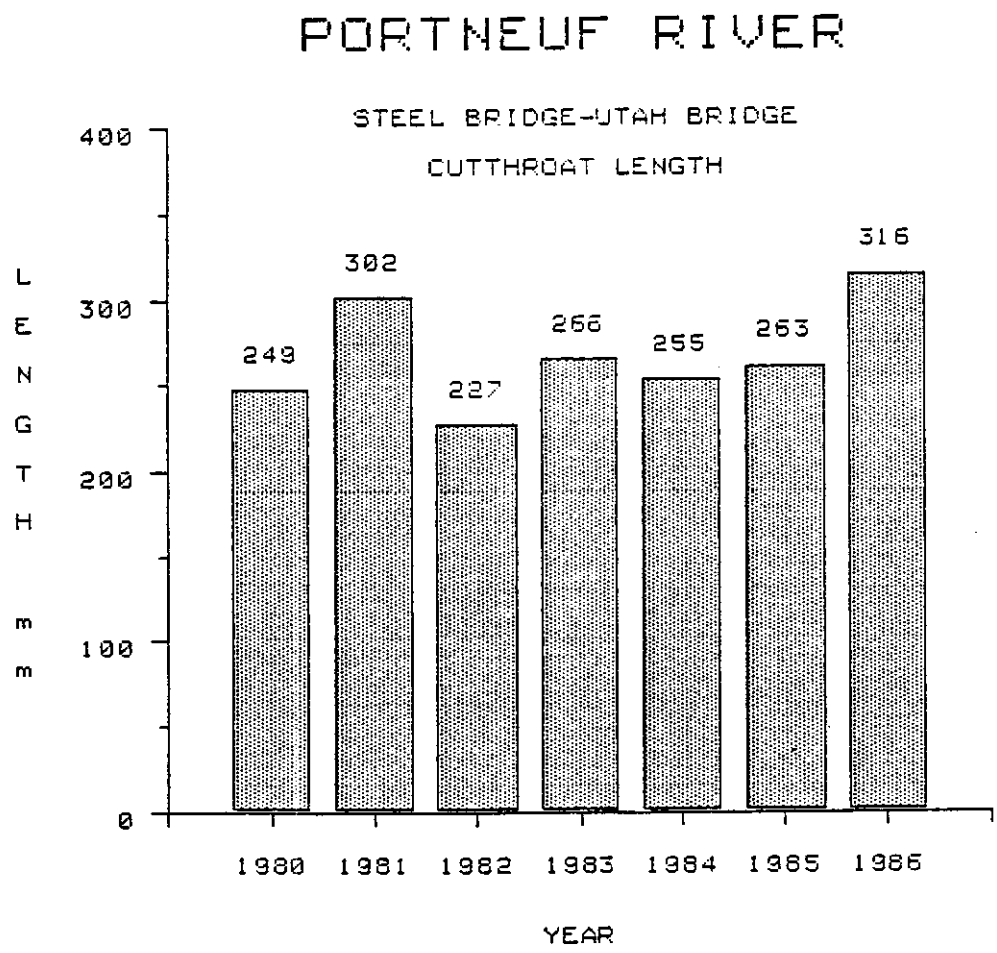

Figure 26. Mean length of cutthroat in the upper section of the Portneuf River, above Lava Hot Springs.

Table 17. Description of electrofishing stations on Portneuf River tributaries, 1986.

Stream	Station	Location	Corridor mean width (m)	Segment length (m)	Area (m^2)
Pebble Creek	PC-1	Ends at bridge behind horse barn on northernmost braid	3.1	207	641
Pebble Creek	PC-3	Begins at pool approx. 50 m above S. Fk. confluence	4.7	98	462
Pebble Creek	PC-4	Starts approx. 50 m above the first cattleguard below N. Fk.	3.7	104	385
N. Fk. Pebble Cr.	NFK-1	Starts at fence immed. above Pebble Ck. road crossing	2.8	132	371
S. Fk. Pebble Cr.	SFK-1	Begins at campground trail 300 m above mouth	Not Taken	Approx. 100 m	N/A
Big Springs Cr.	BSC-1	Begins approx. 60 m above confluence w/right fork	4.5	105	470
King Creek	KCK-1	Begins 12.5 m above first culvert crossing above diversion	1.7	70	119
24 Mile Cr.	TMCK-1	Approx. 2.5 km above Chesterfield Road	Taken	60 m	N/A
Toponce Cr.	TCK-1	Approx. 1.5 km from canal	3.0	180	540
Toponce Cr.	TCK-2	Begins 20 m above forest boundry	5.7	89	507
Toponce Cr.	TCK-4	Begins at confluence of S. Fk and N. Fk.	4.1	80	328

Table 18. Summary of population estimates of **age** 1+ and older trout for electrofishing stations on Portneuf River tributaries.

Stream	Station name	Popul. estimate	Conf. limit (.05)	Fish/ 100 m	Fish/$_2$ 100 m	Species comp.
Pebble Cr.	PC-1	123	115-130	59	19	24% WRB 74% WCT 2% EBT
Pebble Cr.	PC-3	41	37-45	42	9	5% HRB 15% WRB 80% WCT
Pebble Cr.	PC-4	119	112-126	114	31	75% WCT 23% HRB 2% WRB
N. Fk. Pebble Cr.	NFK-1	52	50-54	39	14	100% WCT
S. Fk. Pebble Cr.	SFK-1	1	-	1	-	100% WCT
Big Springs Cr.	BSC-1	51	48-55	49	11	26% HRB 6% WRB 68% WCT
King Cr.	KCK-1	6	±1	9	5	100% WCT
24 Mile Cr.	TMCK-1	0	-	0	0	-
Toponce Cr.	TCK-1	1[a]	-	1	0	100% WCT
Toponce Cr.	TCK-2	102	87-117	115	20	93% WRB 1% HRB 6% WCT
Toponce Cr.	TCK-4	72	70-74	90	22	75% WRB 22% HRB 3% WCT

[a]No second pass attempted.

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Cutthroat trout comprised the majority (88%) of salmonids collected in the drainage. In main stem stations, PC-1, PC-2 and PC-4, cutthroat trout averaged 147 mm, 147 mm and 104 mm in length, respectively (Table 19). Only 5% of the fish exceeded 200 mm in main stem stations, possibly indicating excessive angler harvest (Fig. 27).

Big Springs Creek and North Fork Pebble Creek appear to be important rearing streams for the Pebble Creek cutthroat fishery. Large numbers of fry, visually estimated at 500 to 800 fish, were shocked in the 105-m long Big Springs section. Dense beds of aquatic macrophytes in this stream provide ideal fry habitat. We also observed unusually high densities of fry in the North Fork section, although a formal estimate was not attempted.

Wild rainbow trout were most common in the lowermost study section (PC-1), representing 24% of the population. Rainbow numbers declined in upstream stations, comprising only 15% and 2% of ages 1+ and older fish in stations PC-3 and PC-4. In general, wild rainbow trout were larger than cutthroat, perhaps reflecting differential angling vulnerability.

Hatchery rainbow comprised a significant portion of the population at those stations located near planting sites (PC-4 and BSC-1). In addition, we captured two eastern brook trout in the lowermost station (PC-1).

There are no fish migration barriers on Pebble Creek. Its importance as a spawning stream is unknown; but high quality substrate, particularly in headwater areas, make it a likely source of cutthroat recruitment to the Portneuf River fishery. The consistent decline in wild rainbow numbers we observed while moving upstream seems to indicate some interchange with the main river as well.

King Creek

This stream contains low densities of age 1+ and older trout (5/100 m^2). Cutthroat trout were the only fish captured, averaging 205 mm in total length. This stream is heavily impacted by cattle throughout most of its length and has marginal spawning habitat as a result. The lower third of the stream is completely dewatered during much of the year and spawner access from the Portneuf River via the Portneuf Canal is unlikely.

Twenty-Four Mile Creek

We sampled this stream within a steep-gradient section, which is currently undergoing extensive headcutting. Sediment introduction into Portneuf River from this stream is extensive (Hoover 1985). No fish were sampled in the station; however, eastern brook trout are caught in the stream above the cascades along with an occasional hatchery rainbow escapee from Twenty-Four Mile Reservoir. Cutthroat trout are caught rarely in the stream below the cascades and suitable spawning substrate is virtually nonexistent. Poor substrate, and a series of headgates and irrigation canals near the mouths, eliminate Twenty-Four Mile Creek as a viable recruitment source for the Portneuf River fishery.

Table 19. Salmonids collected during electrofishing survey, Portneuf River tributaries, Fall 1986.

Stream	Transect	Date	Species	Number of fish	Percent of sample	Length range (mm)	Mean length (mm)[a]	Percent >200 mm
Pebble Creek	PC-1		WCT	87	74	75-238	147	5
			WRB	28	24	133-242	175	18
			EBT	2	2	115-120	118	0
Pebble Creek	PC-3		WCT	34	81	73-249	147	9
			WRB	6	14	162-205	184	17
			HRB	2	5	241-180	260	100
Pebble Creek	PC-4	9/24	WCT	143	85	54-211	104	1
			WRB	2	1	116-201	159	50
			HRB	24	14	210-277	247	100
N. Fk. Pebble Cr.	NFK-1	10/1	WCT	334	100	56-178	101(75)	0
S. Fk. Pebble Cr.	SFK-1	9/24	WCT	1	100	186	186	0
Big Springs Cr.	BSC-1		WCT[b]	127	89	37-250	96(62)	5
			WRB	3	2	105-162	133	0
			HRB	13	9	167-284	236	85
King Creek	KCK-1	11/3	WCT	6	100	95-309	205	50
24 Mile Creek	TMCK-1	11/3	None	0	-	-	-	-
Toponce Creek	TCK-1	11/3	WCT	1	100	268	268	100
Toponce Creek	TCK-2	11/4	WCT	4	4	189-257	224	75
			WRB	90	95	72-287	154	12
			HRB	1	1	256	256	100
Toponce Creek	TCK-4	11/4	WCT	6	6	65-197	105	0
			WRB	82	79	57-267	82	12
			HRB	16	15	214-290	246	100

[a] ( ) denotes sample size if all fry were not measured.
[b] An additional 500 to 800 fry were shocked, but not netted for enumeration.

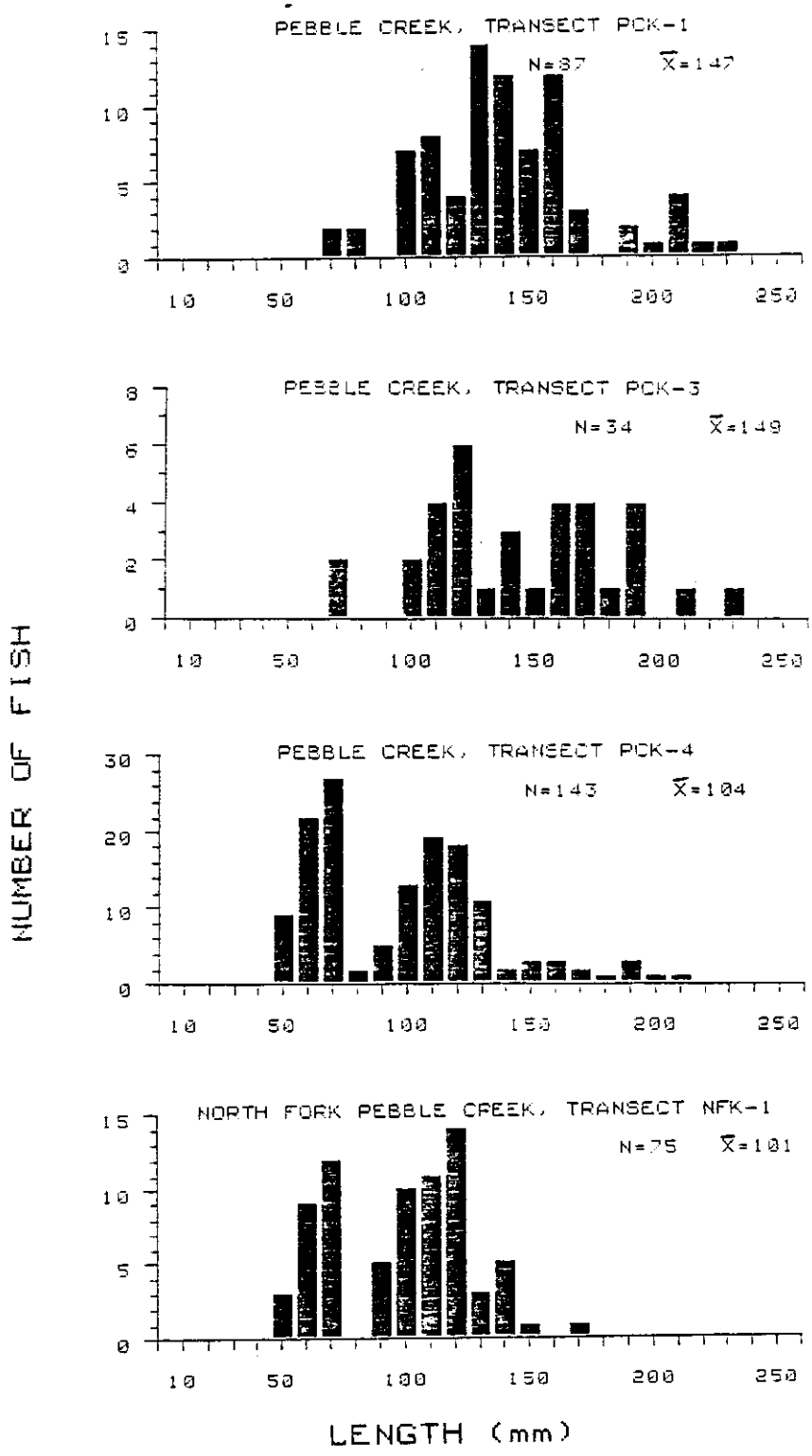

Figure 27. Length distributions of wild cutthroat trout in Pebble Creek, Fall 1986.

Toponce Creek

Toponce Creek is the largest tributary to the upper Portneuf River within the study area. Trout densities (TL>90 mm) ranged from <1 fish/100 m^2 on the lowermost transect on private property (TCK-1) to 22 fish/100 m^2 near headwater tributaries (Table 18). Habitat in TCK-1 was severely impacted by agricultural activities and annual dewatering. Large numbers of redside shiners were present in this station along with a single cutthroat trout.

Wild rainbow trout comprised the majority of salmonids in the two remaining stations, totaling 93% and 75% of all trout sampled in TCK-2 and TCK-4, respectively (Table 18). In general, rainbow trout were small, averaging 154 mm in TCK-2 and 82 mm in TCK-4. Only 12% of the wild rainbow in both study sections exceeded 200 mm in total length (Fig. 28).

Cutthroat trout were present in both segments, but in much lower densities (4% and 6% of all fish) than those observed in Pebble Creek. However, beaver dam complexes in headwater streams, particularly the South Fork, contain good numbers of wild cutthroat trout.

Each year, over half of the stream flow in Toponce Creek is diverted approximately 8 km above its mouth to fill Chesterfield Reservoir. Several diversions in the lower 4 km of the stream on private property are also barriers to migrant salmonids, eliminating Toponce Creek as a source of recruitment for the Portneuf River fishery.

Bonneville Cutthroat Trout Assessment

Preuss Creek

Bonneville cutthroat densities in the two stations were nearly identical at .19 fish/100 m^2 inside the exclosure and .18 fish/100 m^2 immediately downstream (Table 20). Length distributions and mean total lengths of trout in both stations were similar (Fig. 29). The Preuss Creek cattle exclosure has been in place since 1981.

On a linear basis, trout densities declined within the exclosure in 1986 when compared to 1985 levels (Table 21). No such decline was observed in the control station located downstream. The exclosure decline may have been the result of unauthorized grazing within the exclosure during much of the 1986 grazing season.

The electrofishing data indicates that grazing within the exclosure for only one year may reduce trout densities to levels observed in unprotected areas. A reduction in total AUM, fencing, or a major change in rotation strategies appears to be warranted to improve the poor condition of trout habitat on Preuss Creek.

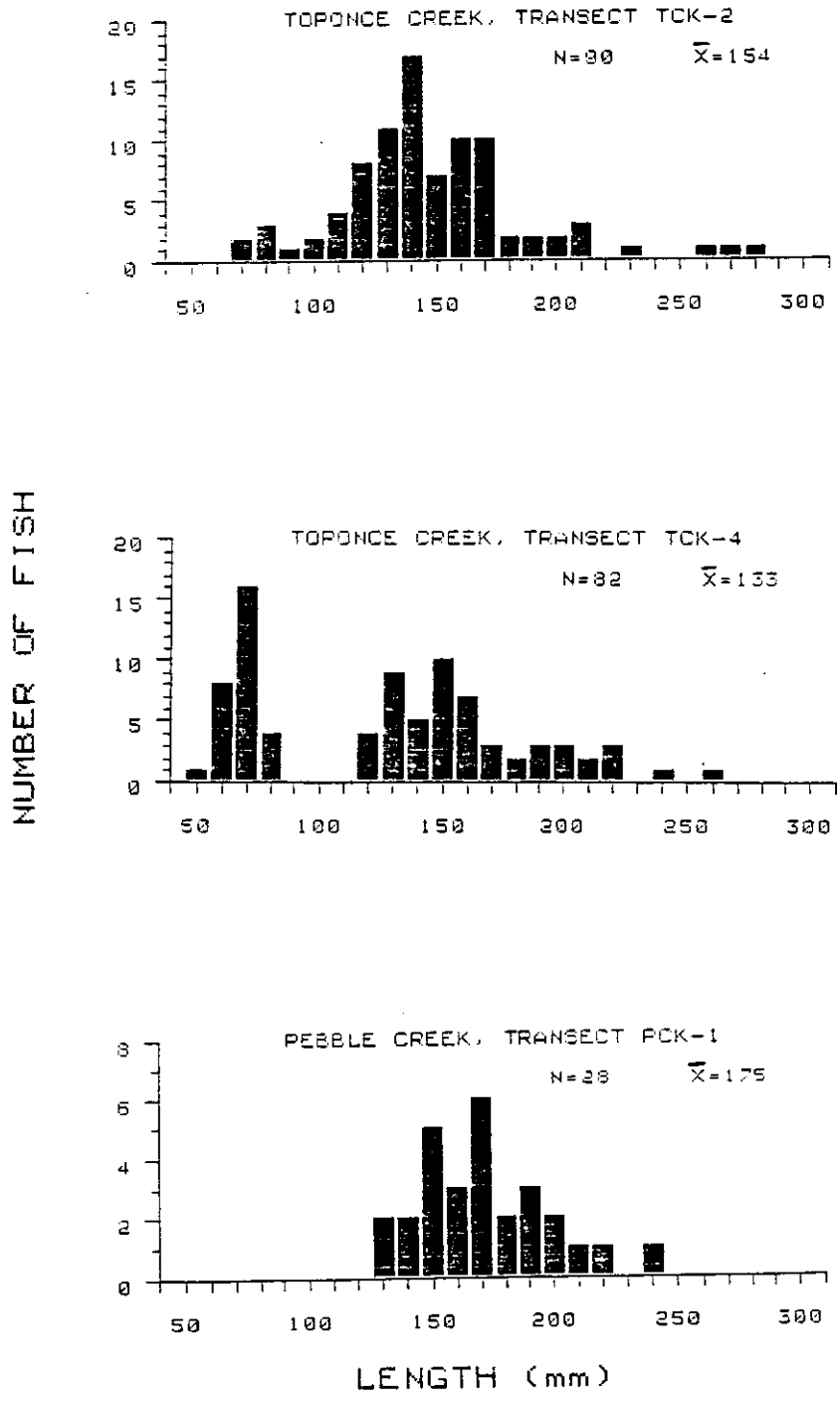

Figure 28. Length distributions of wild rainbow trout in Pebble Creek and Toponce Creek electrofishing stations, Fall 1986.

Table 20. Electrofishing inventories on Preuss and Giraffe creeks, October 1986.

Stream	Transect	Transect length (m)	Area (m^2)	Population estimate	95% CL	Fish/100 m^2	Fish/ m	Mean trout length (mm)	Mean trout weight (g)
Preuss Creek	Immediately below exclosure	119	298	53	48-58	46	.18	143	26
Preuss Creek	Exclosure	105	273	52	49-55	50	.19	140	26
Giraffe Creek	Immediately above exclosure	155	264	51	37-64	33	.19	186	54
Giraffe Creek	Exclosure	132	251	53	49-57	40	.21	190	51

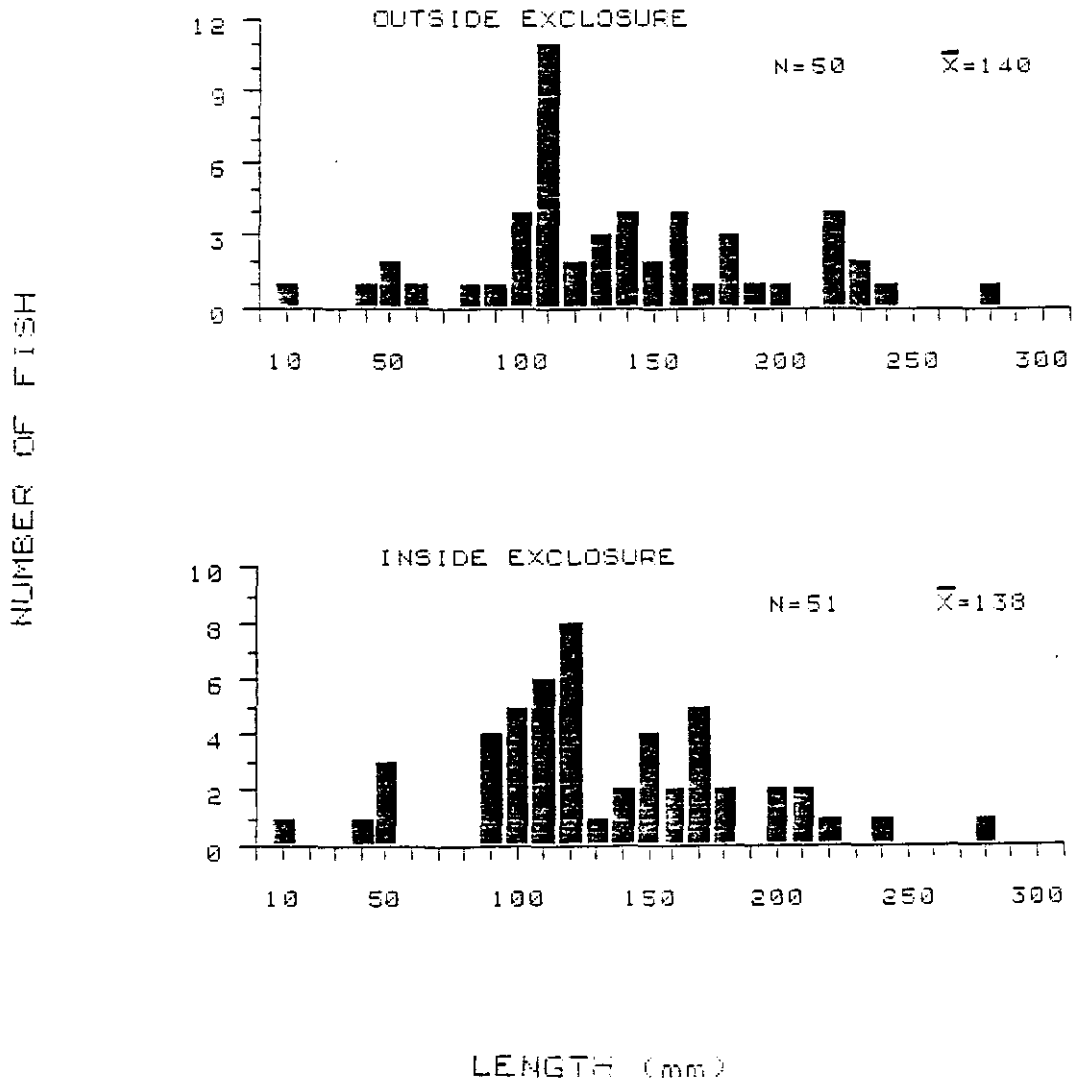

Figure 29. Length distribution of Bonneville cutthroat trout in fenced and unfenced segments of Preuss Creek, October 1986.

Table 21. Bonneville cutthroat trout abundance (fish/100 m) in two Preuss Creek stations, Octobers of **1985 and 1986.**

Station	1985	1986
Within exclosure	88	50
Below exclosure	54	46

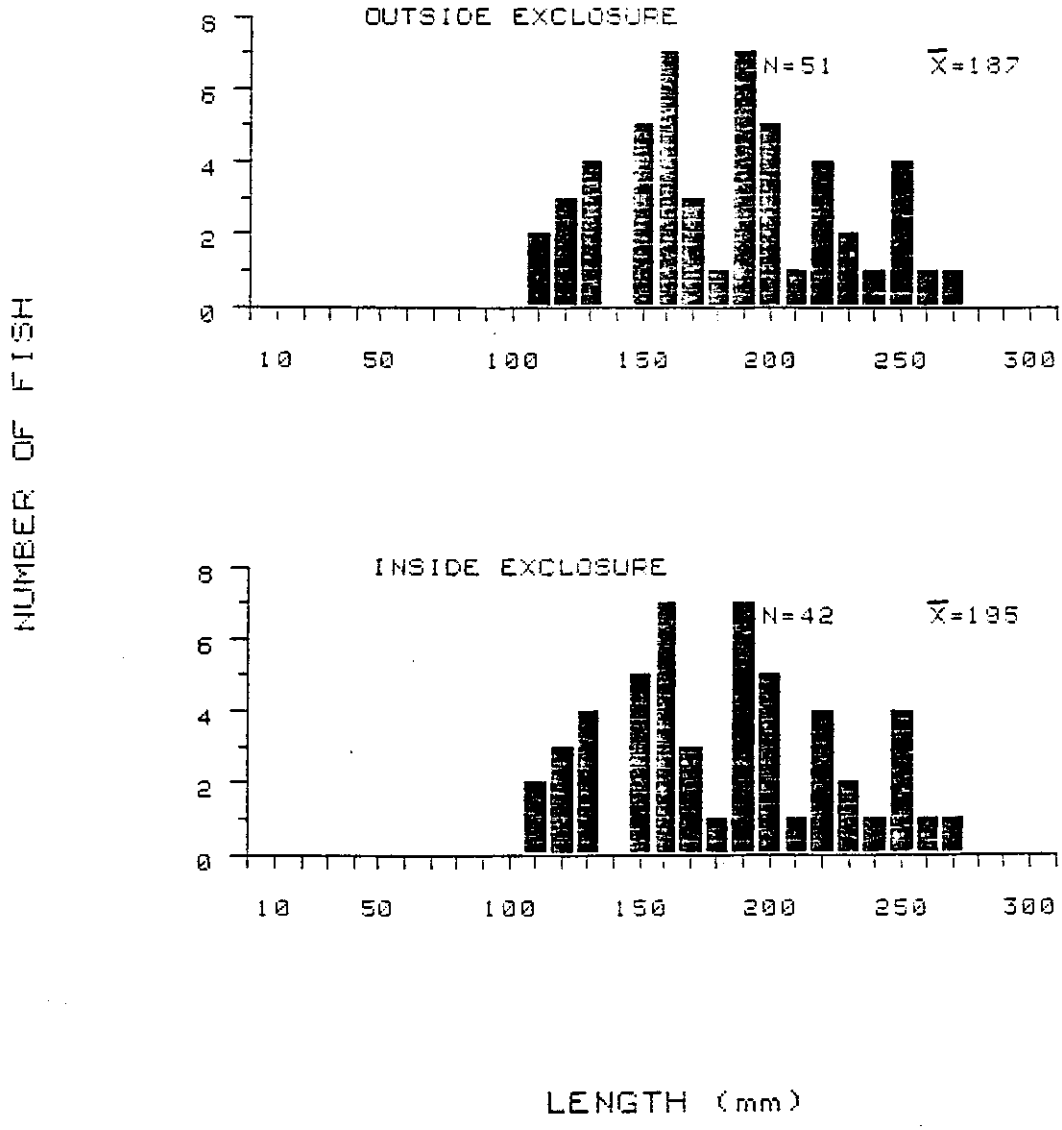

Figure 30. Length distributions of Bonneville cutthroat trout in fenced and unfenced segments of Giraffe Creek, October 1986.

Giraffe Creek

Bonneville cutthroat trout densities in both Giraffe Creek stations were nearly identical (Table 20). No differences in mean length or the range of lengths were observed between stations (Fig. 30). Habitat within the exclosure was in excellent condition, including extensive undercut banks and overhanging vegetation. Although riparian forage use in the grazed station was extensive, the overall habitat condition was similar to that observed within the exclosure. There appeared to be some removal of overhanging vegetation, but undercut banks were still intact along with a narrow stream channel.

The maintenance of high quality trout habitat in the grazed station may have been due partly to steep streambanks and good water depths of 1 m to 1.5 m associated with beaver activity. Both the exclosure and grazing stations lie within a beaver dam and the narrow stream channel (1 m) and water depth may discourage cattle from frequent stream crossings.

In general, grazing large entrenched meadows (Rosgen 1985) in Giraffe Creek at the present level does not appear to seriously impact trout habitat. However, steeper gradient segments upstream flow through narrower valley bottoms and appear to be more susceptible to grazing impacts. The effects of grazing in these areas need further evaluation.

Creel Census - Streams

Stream creel census data are presented in Table 22.

DISCUSSION

Blackfoot River and Tributaries

Although nine consecutive years of spawning ground counts did not establish a statistically significant trend, results obtained during the past four years are cause for concern. This is especially true since there has been a tendency by CNF personnel not to survey portions of original areas where redd counts were low or nonexistent (T. Burton, CNF, personal communication). Under these circumstances, the mean spawner/km data collected during the last three to four years should be biased upward towards higher densities when compared to counts conducted in the late 1970s. Instead of reflecting this upward trend, both redd and spawner counts have, with the exception of the 1982 survey, continued to decline.

In addition, August trout densities in both electrofishing stations appear to be well below 1978 to 1980 levels. The comparatively low numbers of fish present in both stations in 1986 may be the result of variation in annual water flows, which can influence migration timing of adfluvial cutthroat. Flow records are not available for Blackfoot River above the reservoir, but August 1986 water levels were low and good habitat was limited.

Table 22. Anglers interviewed, hours fished, fish harvested and catch rates from various streams in Region 5, 1986.

Stream & month	Number of anglers checked			Hours fished	Fish harvested						
	Resident	Nonresident	Total		Rainbow	Cutthroat	Brook trout	Brown trout	Total	Fish/ angler	Fish/ hour
Bear River											
May	7	9	16	30	9	-	-	-	9	.56	.30
June	6	2	8	-	-	-	-	-	0	-	-
July	8	3	11	16	5	1	-	2	8	.73	.50
Total	21	14	35	46	14	1	-	2	17	.49	.37
Blackfoot River Above Dam											
June	7	4	11	70	18	5	-	-	23	2.09	.33
July	188	54	242	940	22	399	11	-	432	1.79	.46
August	4	2	6	15	1	2	-	-	3	.50	.20
Total	199	60	259	1,025	41	406	11	-	458	1.77	.45
Blackfoot River Below Dam											
February	6	-	6	7	-	-	-	-	0	-	-
March	15	-	15	16	-	3	-	-	3	.20	.19
April	12	-	12	27	-	9	-	-	9	.75	.33
May	208	15	223	929	284	180	-	-	464	2.08	.50
June	48	7	55	144	25	27	-	-	52	.95	.36
July	7	-	7	36	11	7	-	-	18	2.57	.50
August	52	2	54	130	30	39	-	-	69	1.28	.53
October	16	-	16	36	2	21	-	-	23	1.44	.64
November	8	-	8	28	1	17	-	-	18	2.25	.64
Total	372	24	396	1,353	353	303	-	-	656	1.66	.48
Brush Creek											
May	9	-	9	42	1	212	-	14	36	4.00	.86
June	37	7	43	87	1	51	20	20	92	2.14	1.06
Total	46	6	52	129	2	72	20	34	128	2.46	.99

Table 22. Continued.

Stream & month	Number of anglers checked Resident	Nonresident	Total	Hours fished	Fish harvested Rainbow	Cutthroat	Brook trout	Brown trout	Total	Fish/ angler	Fish/ hour
Carter Creek											
June	8	-	8	9	-	7	-	-	7	.88	.78
Cellars Creek											
July	14	-	14	28	2	7	-	-	9	.64	.32
Cherry Creek											
June	8	-	8	4	-	5	-	-	5	.63	1.25
Corral Creek											
May	6	-	6	14	-	-	13	-	13	2.17	.93
Cotton Creek											
May	7	6	13	24	-	11	-	-	11	.85	.46
June	14	3	17	19	6	9	-	-	15	.88	.79
Total	21	9	30	43	6	20	-	-	26	.87	.60
Cub River											
May	14	4	18	14	3	3	3	-	9	.50	.64
June	6	18	24	21	28	-	-	-	28	1.17	1.33
July	5	12	17	20	10	-	3	-	13	.77	.65
Total	25	34	59	55	41	3	6	-	50	.85	.91
Devil Creek											
May	20	65	85	346	24	4	-	-	28	.33	.08
Garden Creek											
May	16	1	17	31	12	68	8	-	88	5.18	2.84
July	6	-	6	13	-	5	-	-	5	.83	.39
Total	22	1	23	44	12	73	8	-	93	4.04	2.11
Grizzly Creek											
May	12	-	12	21	-	-	6	16	22	1.83	1.05

Table 22. Continued.

Stream & month	Number of anglers checked Resident	Nonresident	Total	Hours fished	Fish harvested Rainbow	Cutthroat	Brook trout	Brown trout	Total	Fish/ angler	Fish/ hour
Horse Creek											
May	7	-	7	11	-	17	-	-	17	2.43	1.55
Mill Creek											
May	7	-	7	11	-	-	7	-	7	1.00	.64
Mink Creek											
May	13	-	13	19	38	5	-	-	43	3.31	2.26
June	15	-	15	18	15	8	-	-	23	1.53	1.28
Total	28	-	28	37	53	13	-	-	66	2.36	1.78
Montpelier Creek											
May	31	1	32	29	15	-	-	3	18	.56	.62
Pebble Creek											
May	54	-	54	177	25	4	-	-	29	.54	.16
June	158	8	166	451	140	22	-	-	162	.98	.36
July	138	18	156	443	251	36	-	-	287	1.84	.65
August	74	16	90	246	87	22	-	-	109	1.18	.43
Total	424	42	466	1,317	503	84	-	-	587	1.26	.45
Peck Creek											
May	14	2	16	22	-	3	-	18	21	1.31	.96
Upper Portneuf River											
May	-	-	184	574	201	74	-	-	275	1.49	.48
June	-	-	521	1,610	664	178	-	-	842	1.62	.52
July	-	-	403	1,181	416	56	-	-	472	1.17	.40
August	-	-	266	800	220	41	-	-	261	.98	.33
September	-	-	25	77	31	-	-	-	31	1.24	.40
Total	-	-	1,399	4,242	1,532	349	-	-	1,881	1.34	.44

Table 22. Continued.

Stream & month	Number of anglers checked Resident	Nonresident	Total	Hours fished	Fish harvested Rainbow	Cutthroat	Brook trout	Brown trout	Total	Fish/ angler	Fish/ hour
Lower Portneuf River											
March	11	-	11	24	-	2	2	-	4	.36	.17
June	6	-	6	9	1	-	-	-	1	.17	.11
Total	17	-	17	33	1	2	2	-	5	.29	.15
Rawlins Creek											
June	6	-	6	8	2	6	-	-	8	1.33	1.00
July	26	-	26	80	57	52	-	-	109	4.19	2.10
August	9	-	9	32	9	17	-	-	26	2.89	.81
Total	41	-	41	120	68	75	-	-	143	3.49	1.19
Rock Creek - East Fork	17	-	17	66	55	4	-	-	59	3.47	.89
Snake River Above Dam											
February	12	-	12	30	7	4	-	-	11	.92	.37
March	46	-	46	77	23	2	-	2	27	.59	.35
July	114	2	116	188	25	-	-	4	29	.25	.15
August	62	2	64	141	19	3	-	1	23	.36	.16
Total	234	4	238	436	74	5	4	7	90	.38	.21
Snake River Below Dam											
May	139	9	148	765	214	4	2	39	259	1.75	.34
June	71	1	71	135	57	2	-	7	66	.92	.49
October	7	1	8	8	1	-	-	-	1	.13	.13
Total	217	11	228	908	272	6	2	46	326	1.43	.36
Tincup Creek											
June	5	2	7	11	-	3	-	-	3	.43	.27

Table 22. Continued.

Stream & month	Number of anglers checked			Hours fished	Fish harvested						
	Resident	Nonresident	Total		Rainbow	Cutthroat	Brook trout	Brown trout	Total	Fish/ angler	Fish/ hour
Toponce Creek											
May	40	1	41	139	63	8	-	-	71	1.73	.51
June	130	66	196	429	95	74	4	-	173	.88	.40
July	83	11	94	255	130	22	-	-	152	1.62	.60
August	43	-	43	93	86	15	-	-	101	2.35	1.09
Total	296	78	374	916	374	119	4	-	497	1.33	.54
Trout Creek											
May	6	4	10	18	7	-	6	-	13	1.30	.72
June	8	4	12	28	14	-	1	-	15	1.25	.54
Total	14	8	22	46	21	-	7	-	28	1.27	.61
Whiskey Creek											
June	30	6	36	80	77	-	-	-	77	2.14	.96
July	40	10	50	113	67	-	-	-	67	1.34	.59
August	11	15	26	102	47	-	-	-	47	1.80	.46
Total	81	31	112	295	191	-	-	-	191	1.71	.65
Willow Creek											
May	6	-	6	14	-	-	13	-	13	2.17	.93
Wolverine Creek											
June	11	2	13	22	7	1	-	-	8	.62	.36

Low trout densities observed in 1986 may actually reflect population declines. Habitat impacts, including the construction of a large slurry line and maintenance road in Diamond Creek during the early 1980s, along with a series of recent high water years, appear to have resulted in increased sediment levels in historical spawning areas. In addition, the effect of the new cutthroat trout regulation (3-fish) in the drainage needs to he evaluated.

A more intensive effort is needed in the near future to compare existing trout densities with those observed during the late 1970s. At least 15 electrofishing stations are available for comparative purposes. In addition. increased sedimentation rates need to be evaluated as a possible limiting factor.

Salt River Inventory

Both the Stump and Crow Creek drainages function as spawning tributaries for migrant brown trout. Redd counts indicate that intermediate and lower reaches of both streams are utilized. Sage Creek appears to be the most important stream based on redd densities. Sage Creek was also the only stream sampled where brown trout juveniles comprised most of the fish sampled, perhaps suggesting a resident population. Deer Creek also appears to be a major spawning tributary for brown trout. The actual origin of the large migrant spawners is unknown. The Salt River contains an excellent population of large resident browns and fall migrants that ascend the river from Palisades Reservoir.

All cutthroat trout sampled in the two drainages, displayed characteristics of the fine-spotted cutthroat, a special concern species native to the drainage. Spotting patterns on some individual fish suggested hybridization with Yellowstone cutthroat trout.

In general, cutthroat densities were greatest in small tributaries and in the upper section of Crow Creek. Cutthroat populations in all stations were comprised largely of fish <200 mm in length. The small average size of cutthroat observed during the study may be the result of fall outmigration to the Salt River, or heavy angler harvest. Heavy angler use is suggested by the low densities of cutthroat observed in the lowermost stations of Stump and Crow creeks. These areas are the most accessible and easily fished by anglers.

Wyoming's Auburn Hatchery currently plants Stump and Crow creeks with fine-spotted cutthroat. Crow Creek receives fingerling fish, while Stump Creek is planted with both fingerlings and catchables. We observed no fin deformities on fish during the study and the survival of hatchery plants is questionable. In the future, efforts should be made to evaluate the success of these hatchery plants in terms of creel rates and survival. At the same time, angler harvest of wild cutthroat could be assessed.

As in other southeastern Idaho streams, whitefish in both drainages comprise a substantial fisheries resource, but are virtually unexploited. The lack of angler participation may relate to the timing of the whitefish run from Salt River, which coincides with the big game season. However, most anglers in the area refuse to consider whitefish as a true game fish species.

Portneuf River

The fourfold decline in catch rate for wild rainbow trout in the Portneuf River since 1979 is cause for concern. Catch per unit effort data is generally considered to be a good relative index of abundance, particularly when sample sizes are large (Ricker 1975). Using this rationale, it appears that wild rainbow densities have declined in Portneuf River since 1979. However, our annual fall electrofishing estimates on a 3-km segment of the river have detected no decline in abundance during the same time period. In fact, wild rainbow abundance in the Steel Bridge segment has increased since the early 1980s.

The catch per unit effort data and electrofishing estimates appeared to be in direct conflict. A possible explanation is that wild rainbow in the river were less vulnerable to anglers during the 1986 season. However, no ready explanation for reduced angler vulnerability exists, particularly when considering that cutthroat trout catch rates increased in 1986. Given the conflicting data, the status of the existing rainbow trout population relative to 1979 levels is uncertain.

However, the total wild rainbow harvest estimate for 1986 (402 fish) is insignificant compared to a total estimate of fish abundance for the 38-km study area. Based on mark-recapture electrofishing results on 16.8 km of the river by Mende (Idaho State University, unpublished data), an estimated 14,500 wild rainbow were present in the study area following the 1986 angling season. Given current angler use and success, the low exploitation rate eliminates special regulations as a method to enhance the Portneuf River fishery.

Tributary recruitment to the Portneuf River is virtually nonexistent in three of the four major tributaries (Toponce, Twenty-Four Mile and King creeks) within the study area. Recruitment of cutthroat and/or rainbow trout juveniles from Pebble Creek was not documented during the study, but appears likely. Given the marginal quality of main stem Portneuf River spawning habitat (Mende, ISU, unpublished data), the maintenance of the existing Pebble Creek fishery, particularly the cutthroat trout population, is of critical importance.

JOB PERFORMANCE REPORT

State of: Idaho

Name: REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Project No.: F-71-R-11

Title: Region 5 Technical Guidance

Job No.: 5-d

Period Covered: July 1, 1986 to June 30, 1987

ABSTRACT

We spent some time reviewing and developing comments on activities that would affect game fish populations. This included numerous contacts with personnel from different state and federal land management agencies and private developers. Hydropower development took a considerable amount of time, as did reviews of timber sales, grazing strategy, highway construction projects and stream alterations. Well over half of our time was spent collecting information in order to provide adequate comments.

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John T. Reimer
Regional Fishery Manager

OBJECTIVE

To provide technical guidance to public and private individuals and agencies on matters pertaining to fisheries management in Region 5.

FINDINGS

Water Right Applications

We reviewed three water right applications covering projects on the Bear River and one pertaining to a project on the Portneuf River. Most applications covered hydroelectric projects. In general, they were protested until the applicant was able to demonstrate that game fish populations would not be harmed.

Hydropower Licensing

We reviewed and made comments on 12 different hydroelectric projects during the past year. This included eight on the Bear River system, two on the Portneuf River system and one each on the Blackfoot and Snake rivers. Most projects were fairly small; however, a major one on the Snake River near Shelley took a considerable amount of time. One project on Mink Creek near Preston was completed and went on-line.

Stream Alterations

We reviewed and commented on six stream channel alterations. This included three on the Bear River system, two on the Portneuf River system and one on the South Fork Snake River.

Comments on Forest Projects

We had a number of discussions with Caribou National Forest personnel regarding activities they conducted and the subsequent effects on fish populations. This included grazing activities in watersheds containing Bonneville cutthroat populations, road placement (e.g., McCoy Creek), timber sales (e.g., Mink and Diamond creeks) and mining activities, such as the phosphate producing area of the upper Blackfoot River.

Regional Fishing

I responded to a number of requests for regional fishing information in the form of letters, presentations at public meetings, and verbal contacts.

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APPENDICES

Appendix A-1. Mean back-calculated lengths at age (mm) and mean annual growth increments for largemouth bass[a], Glendale Reservoir, 1986.

Age class	n	Mean length at capture	Annulus 1	2	3	4
1	2	98.0	85.7			
2	1	241.0	123.3	224.9		
3	5	315.4	106.1	203.0	277.2	
4	27	331.6	93.1	176.0	251.0	294.8
No. of fish				35	33	32	27
Weighted mean length				95.4	181.5	255.1	294.8
Increment of growth				95.4	85.6	74.9	43.8
Standard error of length at age				3.0	4.5	3.9	3.1
Standard error of increment				3.0	2.4	2.0	2.0

[a]All scales collected from fish captured during a fishing tournament.

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Appendix *A-2. Mean* back-calculated lengths *at age (mm) and mean* annual *growth for* largemouth *bass*[a], *Lamont Reservoir,* 1986.

Age class	n	Mean length at capture	Annulus 1	2	3	4	5	6	7	8	9
1	45	157.8	61.1								
2	20	251.9	77.7	192.0							
3	5	270.8	78.9	195.3	248.1						
4	1	366.0	71.0	179.4	258.3	305.0					
5	12	416.8	77.6	163.5	231.4	296.6	379.5				
6	4	443.0	86.4	162.6	208.0	271.0	363.3	414.7			
7	0	--	--	--	--	--	--	--	--		
8	0	--	--	--	--	--	--	--	--	--	
9	1	504.0	62.1	115.2	148.0	189.3	322.4	371.5	414.0	454.8	482.1
No. of fish			88	43	23	18	17	5	1	1	1
Weighted mean length			69.4	179.6	228.5	285.4	372.3	406.1	414.0	454.8	482.1
Increment of growth			69.4	101.5	59.7	62.4	88.1	50.9	42.5	40.8	27.3
Standard error of length at age			1.4	3.8	6.7	9.6	6.4	9.5	--	--	--
Standard error of increment			1.4	3.6	4.8	4.0	5.7	8.5	--	--	--

[a]All scales collected from bass salvaged after a chemical treatment.

FISHTABLE

Appendix A-3. Average back-calculated lengths at age (mm) and average annual growth increments for largemouth bass, Condie Reservoir[a], 1986.

Age class	n	Mean length at capture	Annulus 1	2	3	4	5	6	7	8	9	10
1	12	133.7	98.0									
2	26	182.1	110.7	145.6								
3	43	234.0	113.1	160.5	200.5							
4	3	320.3	107.5	178.1	257.3	302.2						
5	4	368.5	98.2	164.6	250.0	304.7	338.5					
6	0	--	--	--	--	--	--					
7	1	432.0	106.0	180.2	254.7	311.0	348.8	376.1	413.4			
8	1	490.0	105.6	190.2	273.0	316.8	378.7	426.9	457.6	472.0		
9	0	--	--	--	--	--	--	--	--	--	--	--
10	1	512.0	103.8	150.3	198.6	236.9	279.0	302.2	361.6	418.6	459.3	477.4
No. of fish			91	79	53	10	7	3	3	2	1	1
Weighted mean length			109.3	157.0	209.8	299.0	337.2	368.4	410.9	445.3	459.3	477.4
Increment of growth			109.3	45.9	47.2	49.2	39.6	32.9	42.5	35.7	40.7	18.1
Standard error of length at age			1.6	2.8	5.4	8.6	12.9	36.2	27.7	26.7	0.0	0.0
Standard error of increment			1.6	2.2	3.1	4.0	5.4	7.8	8.7	21.3	0.0	0.0

[a]Scales were collected from fish captured both by electrofishing and angling.

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Appendix A-4. Average back-calculated lengths at age (mm) and average annual growth increments for largemouth bass, Winder Reservoir[a], 1986.

Age class	n	Mean length at capture	Annulus 1	Annulus 2	Annulus 3	Annulus 4
1	0					
2	7	152.1	81.9	127.7		
3	6	209.5	74.7	151.1	191.3	
4	3	258.7	66.0	150.2	206.3	236.3
No. of fish			16	16	9	3
Weighted mean length			76.2	140.7	196.3	236.3
Increment of growth			76.2	64.5	45.5	30.0
Standard error of length at age			3.0	5.1	7.9	7.9
Standard error of increment			3.0	6.7	3.7	16.8

[a]All scales from fish collected by electrofishing.

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Appendix B. Estimated mean[a] lengths at age (mm) and average annual growth increments (mm) for bass collected from four southeastern Idaho reservoirs during 1986.

Reservoir	Age 1	2	3	4	5	6	7	8	9	10
Mean lengths										
Glendale	95.4	181.5	255.1	294.8						
Lamont	69.4	179.6	228.5	285.4	372.3	406.1	414.0	454.8	482.1	
Condie	109.3	157.0	209.8	299.0	337.2	368.4	410.9	445.3	459.3	477.4
Winder	76.2	140.7	196.3	236.3						
Mean growth increments										
Glendale	95.4	85.6	74.9	43.8						
Lamont	69.4	101.5	59.7	62.4	88.1	50.9	42.5	40.8	27.3	
Condie	109.3	45.9	47.2	49.2	39.6	42.5	35.7	40.7	18.1	
Winder	76.2	64.5	45.5	30.0						

[a]Means are weighted based on the sample size in each year class.

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Appendix C. Functional length-weight relationships for three southeastern Idaho bass populations.

Reservoir	Length-weight equations[a]
Glendale	ln w = -8.608 + 2.749 ln l
Lamont	ln w = -11.817 + 3.240 ln l
Condie	ln w = -12.056 + 3.225 ln l

[a]All equations are derived from a between age group functional regression using weighted means.

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Appendix D. Spawning survey summaries on Upper Blackfoot River tributaries, 1978 to 1986.[a]

Stream	Date surveyed	Km surveyed	No. of spawners		No. of redds	
			Total	Fish/km	Total	Redds/km
Spring Creek	6/15/78	3.0	82	27.3	225	75
	6/11/79	3.9	49	12.6	--	--
	6/17/80	4.9	110	27.7	156	31.8
	6/3/81	4.4	155	35.0	218	50.0
	6/11/82	1.5	118	78.7	138	92
	6/13/83	7.8	214	27.4	232	29.7
	6/21/84	4.8	18	3.8	4	0.8
	6/13/85	2.1	4	1.9	25	11.9
	6/12/86	5.0	18	3.6	89	17.8
Timothy Creek	6/16/78	3.9	52	13.3	25	6.4
	6/15/79	6.3	20	3.2	--	--
	6/17/80	7.0	135	19.3	--	--
	6/81	Not Surveyed				
	6/12/82	0.6	14	23.3	4	6.7
	6/20/83	1.9	13	6.8	--	--
	6/19/84	1.2	13	10.8	--	--
	6/85	Not Surveyed				
	6/12/86	4.0	18	4.5	12	3.0
Bacon Creek	6/8/78	4.4	97	22.1	30	6.8
	6/15/79	6.0	79	13.2	--	--
	6/13/80	6.0	144	24.0	--	--
	6/81	Not Surveyed				
	6/12/82	1.1	58	52.7	37	33.6
	6/20/83	1.9	34	17.9	16	5.3
	6/19/84	0.9	26	28.9	12	13
	6/13/85	Not Surveyed				
	6/12/86	3.5	53	15.1	33	9.4

Appendix D. Continued.

Stream	Date surveyed	Km surveyed	No. of spawners		No. of redds	
			Total	Fish/km	Total	Redds/km
Browns Canyon Creek	6/12/78	1.9	23	12.1	4	1.3
	6/11/79	5.0	6.0	1.2	--	--
	6/12/80	3.5	26	7.5	26	7.4
	6/81	Not Surveyed				
	6/11/82	1.5	14	9.3	3	2
	6/21/83	1.5	6	4.0	4	2.7
	6/20/84	1.6	8	5.0	2	1.3
	6/13/85	1.6	1	0.6	4	2.5
	6/12/86	1.6	1	0.6	6	3.8
Sheep Creek	6/29/78	2.1	66	31.4	17	8.1
	6/13/79	3.9	13	3.3	--	--
	6/18/80	6.1	42	6.9	100	16.3
	6/8/81	4.6	6	1.3	55	12.0
	6/18/82	1.3	8	6.2	22	16.9
	6/22/83	3.7	6	1.6	14	3.8
	6/20/84	2.9	12	4.1	10	3.5
	6/13/85	2.5	0	0	22	8.8
	6/13/86	4.3	5	1.2	25	5.8
Kendall Creek	6/10/78	1.0	4	4.0	2	2
	6/11/79	3.0	1.0	0.3	--	--
	6/17/80	2.0	10	5	4	2
	6/3/81	0.9	19	21.1	42	46.7
	6/11/82	0.7	48	68.6	16	22.9
	6/22/83	0.7	10	14.3	17	24.3
	6/20/84	Not Surveyed				
	6/13/85	Not Surveyed				
	6/11/86	1.5	3	2.0	1	0.7
Timber Creek	6/10/81	1.4	3	2.1	3	2.1
	6/10/82	1.0	23	23	10	10
	6/13/83	2.0	80	40.0	46	23.0
	6/19/84	1.8	10	5.6	4	2.2
	6/12/85	1.8	10	5.6	3	1.7
	6/11/86	1.8	6	3.3	5	2.8

Appendix D. Continued.

Stream	Date surveyed	Km surveyed	No. of spawners Total	No. of spawners Fish/km	No. of redds Total	No. of redds Redds/km
Stewart Can. Cr.	6/10/81	2.3	1	0.4	1	0.4
	6/17/82	1.8	0	0	2	1.1
	6/13/83	Not Surveyed				
	6/19/84	1.8	5	2.8	1	0.6
	6/12/85	1.8	4	2.2	0	0
	6/11/86	1.8	0	0	1	0.6
Lanes Creek	6/13/86	1.1	14	12.7	6	5.5
Lower Diamond Creek	6/11/86	1.6	2	1.3	2	1.3
Diamond Creek Spring	6/12/86	0.5	0	0	38	76.0

[a]1978 to 1980 data from Thurow (1979; 1980) and 1981 to 1985 data provided by CNF.

Appendix E. Estimated trout harvest by species and interval on upper Portneuf River from Lava Hot Springs to Chesterfield Reservoir, during 1979 and 1986.

Interval	Hatchery rainbow 1979	Hatchery rainbow 1986	Wild rainbow 1979	Wild rainbow 1986	Cutthroat 1979	Cutthroat 1986	Total 1979	Total 1986
1	624	429	992	120	473	205	2,089	754
2	1,091	1,009	440	60	167	186	1,698	1,255
3	665	691	265	76	68	259	998	1,026
4	450	823	298	49	60	72	808	944
5	342	253	140	18	16	50	498	321
6	252	264	226	26	13	56	491	346
7	424	136	230	45	28	30	682	211
8	280	246	187	8	22	14	489	268
TOTAL	4,128	3,851	2,778	402	847	872	7,753	5,125

Appendix F. Estimated angler hours expended on Portneuf River between Lava Hot Springs and Chesterfield Reservoir in 1979 and 1986.

Interval	Census dates	1979	1986
1	5/24-6/6	5,470	1,637
2	6/7-6/20	3,035	2,197
3	6/21-7/4	2,303	1,983
4	7/5-7/18	1,624	2,049
5	7/19-8/1	1,395	774
6	8/2-8/15	967	997
7	8/16-8/29	1,119	772
8	8/30-9/12	945	590
Total	5/24-9/12	16,858	10,999

Appendix G. Harvest rates (fish/hr) by species on upper Portneuf River during two-week intervals, **1979** and **1986.**[a]

Interval	Census dates	HRB		RB		CT		Total	
		1979	1986	1979	1986	1979	1986	1979	1986
1	5/24-6/6	.11	.27	.09	.11	.18	.06	.38	.44
2	6/7-6/20	.33	.42	.06	.09	.16	.03	.55	.54
3	6/21-7/4	.30	.34	.02	.14	.11	.04	.43	.52
4	7/5-7/18	.26	.35	.04	.03	.17	.02	.47	.40
5	7/19-8/1	.22	.30	.01	.06	.10	.01	.33	.37
6	8/2-8/15	.33	.27	.01	.06	.22	.03	.56	.36
7	8/16-8/29	.33	.18	.02	.04	.13	.06	.48	.28
8	8/30-9/12	.27	.42	.03	.02	.19	.01	.49	.45
Mean		.23	.35	.05	.08	.17	.04	.45	.47

[a]1979 data from Heimer (1980).

Appendix H. Estimated catch rates (fish/hr) on sections of upper Portneuf River, 1986.

Interval	Wild rainbow trout Section 1	Section 2	Section 3	Total
5/24-6/6	.05	.10	.15	.07
6/7-6/20	.02	.03	.07	.03
6/21-7/4	.05	.02	0	.04
7/5-7/18	.03	.02	0	.02
7/19-8/1	.04	.01	0	.02
8/2-8/15	.03	.02	0	.03
8/16-8/29	.03	.07	.14	.06
8/30-9/12	.01	.02	0	.01
TOTALS	.03	.04	.06	.04

Interval	Wild cutthroat trout Section 1	Section 2	Section 3	Total
5/24-6/6	.10	.15	.20	.13
6/7-6/20	.10	.03	.34	.08
6/21-7/4	.13	.14	0	.13
7/5-7/18	.04	.02	.06	.04
7/19-8/1	.10	.04	0	.06
8/2-8/15	.04	.07	.04	.06
8/16-8/29	.05	.04	0	.04
8/30-9/12	.02	.04	0	.02
Totals	.09	.07	.14	.08

Appendix H. Continued.

Interval	Hatchery rainbow trout			Total
	Section 1	Section 2	Section 3	
5/24-6/6	.30	.22	.04	.26
6/7-6/20	.47	.44	.44	.46
6/21-7/4	.26	.51	.46	.35
7/5-7/18	.35	.50	.29	.40
7/19-8/1	.17	.43	0	.33
8/2-8/15	.28	.25	.35	.26
8/16-8/29	.10	.22	.36	.18
8/30-9/12	.45	.39	.08	.42
Totals	.33	.39	.30	.35

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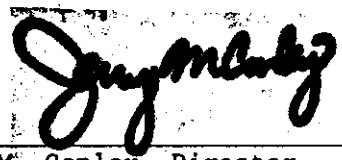
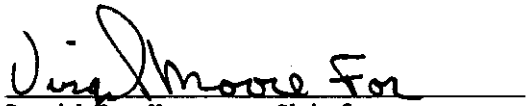


Jerry M. Conley, Director



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